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Journal of Educational Research

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JOURNAL OF EDUCATIONAL RESEARCH

This journal was established to support educational research workers in all phases of the great problems of teaching. Started in 1920 under the editorship of Dr. B. R. Buckingham and associates among the members of an association of directors of educational research, and accepted as the official organ of the Educational Research Association, its purpose has at no time been confined to a narrow line of specialized research but has been concerned also with professional applications for all workers in education.

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JOURNAL *of* EDUCATIONAL RESEARCH

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RESEARCH ON THE TEACHING OF ENGLISH

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University of Wisconsin

DOCTOR LYMAN'S *Summary of Investigations in Composition* just issued by the University of Chicago Press, offers an essential starting point for any discussion of the present state of English research. It gives an admirable resume of everything that has been done in this branch of the subject to date. Dr. Gray's *Summary of Investigations in Reading*, which included such studies in the literature field as were then available, presented the situation then with reference to other aspects of English. The purpose of the present article is to present an analysis of the research situation as depicted in current and unpublished investigations.

It is apparent that a great deal of research bearing on the teaching of English, going on in various places, particularly in universities and city research bureaus, is never adequately reported. Because of the possible value of this material, the National Council of Teachers of English commissioned the writer to spend seven weeks in travel to as many research centers as he could reach, collecting information about investigations relative to the teaching of English. The value of the trip is perhaps in part indicated by the fact that over three hundred studies were listed under the headings: Classroom Procedure, Course of Study, Tests and Measurements, Reading, Literature, English Usage, and Composition, Grammar, and Spelling.

The list itself indicates wide and varied activity, with a good deal of duplication, which should be clearly distinguished from coöperative study of a problem, or from the re-checking of conclusions reached in earlier investigations.

The value of the material collected may be indicated by a few examples. Several important studies specifically support Dr. Ashbaugh's finding that pupils' out-of-school writing shows no improvement,[1] and

[1] Ashbaugh, E. J. "Non-School English of High-School Students," *Journal of Educational Research*, XV, (May, 1927), pp. 307-313.

present clear evidence that English teaching as now practiced is not getting the results so confidently stated in the usual hopeful lists of objectives. A study similar to Dr. Ashbaugh's made by Mrs. Viljoen and Miss Chamberlain at the University of Wisconsin almost precisely duplicated his findings. Dr. William L. Connor of the Cleveland Schools Research Bureau gave the same English tests to 1000 seventh-graders, 600 tenth-graders, and 400 high-school seniors. The resulting scores showed an increased proficiency grade by grade in each test. But on examining these scores more closely, Dr. Connor discovered the startling fact that the 400 best seventh-graders did as well on every test as the 400 high-school seniors. Six years of English teaching in high school had done little or nothing save eliminate the non-academic pupils.

Altogether, such evidence puts upon English teachers the burden of proof that their present practices are defensible, and should be of great use in stirring them up to give more attention to scientific experimentation. What we have learned about the teaching and testing of composition particularly, and about reaching our usually announced objectives in composition and in literature, is both incomplete and too little known to the average reader. The need of further research in these fields will be discussed later in this article.

The value of vocabulary tests upon words out of context is seriously questioned by another study of Connor's,[2] in which no significant correlation was discovered between the scores in such tests and achievement in standard reading tests. Even more serious doubt was cast upon the usual memory test in the field of literature by a part of Miss Omwake's study at George Washington University. She made a correlation between the number of books pupils had read voluntarily during the school year with the respective pupils' rankings on her literature test, which was almost entirely factual. Though she found a correlation of .40 with the total number of books read, she found practically no correlation with the number of books of reasonably good literature when she had thrown out the obviously worthless.

A half dozen studies at various points, notably Dr. Mary C. Burch's at Stanford University, since published[3], and that of Dr. Koos and Dr. Kefauver at the University of Minnesota, will undoubtedly hasten the complete revision of reading lists and placement of literature in the high

[1] Research Bulletin No. 72, Board of Education, Cleveland, Ohio.

[2] *Genetic Psychology Monograph*, XIV, Nos. 2 and 3, Aug.-Sept., 1928.

school. A half-dozen studies on this subject and on the teaching of appreciation at Iowa University, by Dr. Angela Broening at Johns Hopkins, and elsewhere, are making a similar contribution to the placement of literature in the grades and to the effective teaching of appreciation.

Most important of all, probably, are various researches now going forward in the field of English usage. The scientific study of language is very little older than the scientific study of education—only about a century of important work in this field has been done. The results of scholarly study of language have just begun to be made available to English teachers. Various research projects are under way. A preliminary study, intended to get a record of the observation of cultivated usage by trained linguists, was reported in the *English Journal* in May, 1927.[4] This study is being carried further to a similar investigation of another list of expressions frequently condemned but fully accepted in cultivated use. Also, with the help of Professor Fred R. Conkling, of Manchester College, a record of the actual punctuation usage of publishing houses, is in process of being secured. So far as our preliminary work shows, more than 40 percent of the proscriptions in grammars and rhetorics, in courses of study, and in standard tests, are not errors at all, but forms in perfectly good cultivated use.

A major project in this field is being carried on by Professor C. C. Fries. Like the studies just mentioned, this work is being subsidized by the National Council of Teachers of English. Professor Fries has a considerable mass of manuscript written by persons whose precise educational and social status is on record. From analysis of these documents it will be possible to describe very accurately, and in quite complete detail, the sort of English used by barely literate persons, by those with a high-school education, by those with university or college training. Professor Fries plans also to get a distribution of this information by dialect areas.

This is unquestionably the most thoroughgoing and valuable investigation which has ever been attempted into the social levels of usage. It will enable teachers and others to make clear that usage is a matter not of right and wrong, but of social gradation. The objection to "you was" or "I seen" will appear, not as an objection to something inherently "wrong," but to a form whose use will subject the user to a certain amount of social obloquy, and very often to distraction of his hearer's

[4] Leonard, S. A. and Moffett, H. Y. "Current Definitions of Levels in English Usage," *English Journal*, XVI, (May, 1927), pp. 345-359.

attention from the thing he wants to communicate. It will also be made clear from this study that comparatively few of the forms commonly reprehended in school courses of study and the like are really worth correcting. When we know even more positively than at present what conventional forms are really important to establish, we shall have a better chance in our teaching of English to get them established.

It seems clear that an enormous waste in the testing and teaching program in English might be obviated by vigorously continuing and propagating the research now under way. Similar evaluation studies need to be made of such measures as composition scales, comprehension tests in reading, and, most difficult of all, tests of literary appreciation. But these projects are not nearly so well defined as that of discovering the validity of language tests and of present inclusions in the curriculum on the usage side.

Dr. Henmon's admirable summary of the findings of the Modern Language Study,[5] naturally suggests the very great need of a similar thoroughgoing investigation of the teaching of English. From what has been here reported, it seems reasonable to conclude that the English people are now in better condition to start such a study than were the modern language people at the time their project was launched. Such a thoroughgoing investigation of the teaching of English is highly desirable, and a basis for such a program has been built through the coöperative efforts of the English council and the various research agencies in the fields of education.

As has been suggested, another important conclusion from this research expedition, of which only a few sample findings have been listed here, is that what has been reasonably well established by scientific tests needs to be made more generally available. Hundreds of graduate studies in colleges and universities, locally published research reports, and the like, are practically unknown. Either their conclusions are sound and should be brought to bear upon the making of courses of study and the practice of teaching, or else they need careful and scientific re-checking and evaluation. Meanwhile, duplication is going on with considerable waste and loss of valuable energy. The Research Bureau of the National Education Association is doing a most useful piece of work in publishing titles of such research bureau studies as it can collect by correspondence, but a great deal of material is missed even here.

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[5] Henmon, V. A. C. "Some Significant Results of Modern Foreign Language Study," *Journal of Educational Research*, XIX, (February, 1929), pp. 79-91.

As a first step, it may be suggested that universities and colleges be urged to publish in printed or mimeographed form, and to send to such interested schools and societies brief summaries of all studies accepted for degrees, and possibly of unusually good seminar papers. If a standard form for such summaries could be adopted such as that required by the graduate school of Teachers College, Columbia University, and of the University of Southern California, it would be possible for whoever is interested to find out whether a particular study was probably important for him to secure and analyze. In addition, it would be desirable if the practice could become increasingly common of publishing, in the form of articles or summaries in the *Journal of Educational Research*, the *English Journal*, and similar periodicals, the gist of all really valuable research, especially where such research could not be published in full.

The most important impression of this whole investigation tour has been a sense of the growing cordiality of coöperative relations between all agencies interested in the betterment of English teaching. State and city research bureaus, and departments of English and of education in colleges and universities, have not only shown a cordial disposition to share their findings, but a clear sense of the necessity for thorough, objective explorations of the field of English teaching. There is recognition also of the need, in such explorations, of adequate checks by all who can contribute to making them properly—not only by specialists in measurement and in scientific procedure, but by those who have made adequate study of linguistics or rhetoric, esthetics or literature. In the increasing unity of attack by all these forces, there is good hope that many of our oldest and most baffling problems may get on toward solution. Immense sums are being spent profitably on research in industry and commerce, and the older sciences are benefiting by generous grants of time and money for study of particular problems. Whatever is capable of being scientifically investigated in the field of English, as in each subject field, should have attention and adequate support.

THE THREE-YEAR CURRICULA IN NORMAL SCHOOLS FOR THE PREPARATION OF KINDERGARTEN-PRIMARY TEACHERS

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RECENTLY there has been a general tendency on the part of teacher-training institutions to extend their curricula from that of the traditional two-year course to three years, and four years. In the case of many institutions the extension has gone to four years with the power to grant a degree upon its completion. The reasons for such extensions are many and varied. In some cases it was the contention that two years were too brief a time to give the necessary preparation for varied types of teachers. In other cases it was announced that new subjects should be added better to prepare prospective teachers on various levels. This latter reason was, and is, especially assigned in the case of those schools with newly organized curricula purporting to prepare, specifically kindergarten-primary teachers. The writer has been sufficiently interested in this general tendency, to the extent, that he has made a study of it in so far as it refers to the introduction of three-year curricula for the preparation of kindergarten-primary teachers. A report of the findings of this study comprises the remainder of this discussion.

PURPOSE

It was the purpose of this study to ascertain, upon the basis of a comparison of two-year and three-year institutions preparing specifically kindergarten-primary teachers, an answer to the following questions.

1. Does the additional year change the general direction of the preparation of this type of teachers as indicated by the relative emphasis upon the five major divisions of the curriculum?
2. Does the additional year represent an increase in time for the same types of subjects found in the two-year curriculum; or does it represent the addition of new types of subjects?
3. Does the additional year, in the light of the answers to questions one and two, seem justified?

METHODS OF PROCEDURE

In view of the fact that practically the same methods were employed here as were used in a study[1] previously reported, the account of methods of procedure here will be accordingly abbreviated.

In the first place, the analysis of the curriculum content and practices of the institutions studied was based upon descriptions in catalogs and replies to personal letters sent to the heads of various institutions.

In the second place, an analysis of the "Educational Directory" for the period 1923-1925 revealed fifteen schools giving a three-year course *specifically* for the preparation of kindergarten-primary teachers. Other three-year courses were listed but they gave either separate primary or kindergarten training. These fifteen schools were located as follows: ten of these schools were found in New York state; two in Ohio; and three in Massachusetts. These fifteen schools represent all of the three general types of control, namely, state, city and private.

In the third place, the comparison of these two types of schools was made on two bases: first, the five previously described categories—General content, illustrated by English; General professional, illustrated by psychology and history of education; Special professional, illustrated by kindergarten theory; Special and technical content, illustrated by music, fine arts and penmanship; Observation and participation, illustrated by practice teaching; and second, the individual subjects of each curriculum.

In the fourth place, the comparison was made in terms of percentage-credits, that is, each subject was given a value in terms of the percent of credit it represented in the total amount of credits required for graduation. For example, if a certain school required fifty credits for graduation, and psychology was assigned two credits, the percentage credit would be 4.00. To reduce this system to a comparable basis for two-year and three-year courses, the percentage-credits of the two types of institutions were evaluated in the ratio of two or three respectively. For example, if psychology is given a percentage-credit of 4.00 in both the two-year and three-year curricula, the relative percentage-credits in comparable terms would be respectively 8.00 and 12.00.

RESULTS

Does the Additional Year Change the General Direction of Preparation? Table I below presents a summary comparison of the two-year

[1] Thompson, C. H. "The Preparation of Kindergarten-Primary Teachers," *Educational Administration and Supervision.* XIII, (October, 1927), pp. 449-459.

and three-year curricula on the basis of categories or general divisions of the curriculum. The first column, reading from left to right, gives the names of the categories. The next two columns give the average percentage-credit, and the range of emphasis for each category in the two-year curriculum. The last two columns give the average percentage-credit, and range of emphasis for each category of the three-year curriculum. This means that the general content subjects in the two-year schools gave 21.56 percent of their effort to those subjects, and varied in practice from schools giving 1.82 percent to those giving fifty percent. In the three-year schools, 18.28 percent of their total effort was given with a range of 4.72 to 27.36 percent.

TABLE I

COMPARISON OF FIVE CATEGORIES—TWO-YEAR AND THREE-YEAR CURRICULA

CATEGORIES	AVERAGE PERCENT	TWO-YEAR RANGE	AVERAGE PERCENT	THREE-YEAR RANGE
1. Special and Technical Content	29.61	8.88–50.96	29.76	21.94–37.72
2. General Content	21.56	1.82–50.00	18.28	4.72–27.36
3. Observation and Participation	16.76	3.33–49.05	22.27	7.95–36.05
4. General Professional Content	16.01	5.88–29.52	16.05	5.63–26.86
5. Special Professional Content	15.65	4.04–33.91	13.49	8.72–17.11

The data in this table seem to point to two significant general conclusions.

1. There is relatively very little difference in the emphasis in the two-year and three-year curricula as far as the five general categories are concerned. In the case of the "general content," and "Special professional" subjects, the three-year curriculum gives slightly less emphasis, (the "General professional," and "Special and technical content" categories remain relatively the same). In "Observation and participation" there is, *relatively*, considerably more emphasis given in the three-year curriculum than is given in the two-year curriculum. In view of the fact that the three-year curriculum represents a new tendency, it is significant to note that the increase is *mainly* upon this category.

   The above observation indicates, in general, that the *general direction* of the kindergarten-primary teacher's preparation is relatively the same in both types of schools. The additional year in the three-year type of school means more an increase in time than a change in the general direction of preparation. This observation, however, should be noted with the apparent exception of "Observation and participation" in mind.

2. Again, it is to be seen that the amount of variation in each category remains *relatively* the same, although the three-year curriculum shows, in general, more uniformity. This latter fact may be due to the smaller number of three-year curricula available for this comparison. "Observation and participation," and "General content" subjects show, both in the two-year and three-year curricula, the greatest amount of diversity in practice. It should be noted, however, that the two-year curriculum shows the greater amount of variation in both categories. "General professional" subjects show about the same amount of variation in both types of schools. "Special and technical content," and "Special professional" subjects show a decidedly higher degree of uniformity in the three-year than in the two-year curriculum, but their relative positions in respect to the other categories remain about the same.

The observations here indicate that not much more agreement has been reached by normal school authorities in respect to what "General content" courses, and what amount and kind of "Observation and participation" should be given than was found in the case of the two-year schools.[2] In general, these data corroborate the conclusion indicated above that the addition of another year to the two-year curriculum has neither materially changed the direction of preparation, nor has it indicated any more definitely that the needs of the kindergarten-primary teacher are any better known, or met.

Does the Additional Year Represent an Increase in Time for the Same Subjects Found in the Two-Year Curriculum; or the Addition of New Subjects? While it has been seen that the general direction, and aim of preparation are quite obviously the same in both the two-year and three-year curricula, it is quite possible that entirely different subjects may be used to attain the common aim. Therefore, the curricula of these two types of schools are compared with reference to the elimination and addition of subjects in the three-year curriculum that do, or do not, appear in the two-year curriculum.

Table II below contains a composite list of categories of the subjects given in both curricula. Reading from left to right, the first column indicates merely the total number of subjects in both curricula numbered serially from one to ninety-one. The second gives the names of the sub-

[2] See footnote one.

jects by categories. The third column of symbols indicates an increase, decrease, elimination, or addition, using the three-year curriculum as the basis of interpretation. An asterisk denotes that more time is spent on that subject in the three-year curriculum than in the two-year curriculum. A (–) indicates that less time is spent upon that subject in the three-year curriculum than in the two-year curriculum. A (0) indicates that such a subject appears in the two-year curriculum, but does not appear in the three-year curriculum. A (x) indicates that this subject appears in the three-year curriculum, but does not appear in the two-year curriculum.

TABLE II

Comparative Emphasis Upon Individual Subjects in the Two-Year and Three-Year Curriculum

	GENERAL CONTENT	
1.	English Composition	*
2.	Oral Expression	*
3.	English Literature	0
4.	General Literature	*
5.	Poetry	–
6.	Content Electives Prescribed	–
7.	Content Electives, free	–
8.	Sociology Introductory	0
9.	Geography	0
10.	World History	0
11.	American History	*
12.	American Government	x
13.	Political Science	*
14.	Current Events	0
15.	Economics	*
16.	European History	*
17.	Physical Education	*
18.	Biology	*
19.	General Science	x
20.	Physiology	0
	GENERAL PROFESSIONAL	
21.	General Psychology	*
22.	Educational Psychology	*
23.	Child Psychology	*
24.	Tests and Measurements	*
25.	History of Education, general	*
26.	History of Elementary Education	–
27.	History and Prins. of Education	–
28.	History of Education in U. S.	x
29.	School Management	–
30.	Introduction to Teaching	–
31.	Educational Sociology	–
32.	Principles of Education	*
33.	Prin. of Teach. and Gen. Methods	–
34.	Professional Electives	0
35.	Educational Biology	x
36.	Professional Ethics	*
	OBSERVATION AND PARTICIPATION	
37.	General Practice	–
38.	Introductory Practice	*
39.	Advanced Practice	*
40.	Kindergarten Practice	*
41.	Primary Practice	*
42.	Kindergarten-Primary Practice	0
43.	Teaching of Special Subjects	x
44.	Observation	*
	SPECIAL PROFESSIONAL	
45.	Kindergarten Principles	–
46.	Kindergarten Theory (intro.)	*
47.	Kindergarten Theory (adv.)	*
48.	Kindergarten Curriculum	–
49.	Kindergarten Methods	–
50.	Kindergarten Hist. and Prin.	*
51.	Primary Methods	*
52.	Primary Curriculum	*
53.	Arithmetic Methods	–
54.	Industrial Arts Methods	*
55.	Music Methods	*
56.	Fine Arts Methods	–
57.	Geography Methods	0
58.	History and Civics Methods	0
59.	Penmanship Methods	0
60.	Methods of Teach. Foreign Children	0
61.	Nature Study Methods	0
62.	Physical Education Methods	0
	SPECIAL AND TECHNICAL	
63.	Music, theory	*
64.	Music, appreciation	*
65.	Music, content and methods	–
66.	Music, vocal	x
67.	Music, piano	*
68.	Art, theory	*
69.	Art, appreciation	*
70.	Art, content and methods	–
71.	Handwork, general	*
72.	Construction and Play Material	*
73.	Household Arts	*
74.	Technical Electives	0
75.	Plays and Games	*
76.	Gymnastics	0
77.	Playground Supervision	0
78.	Child Hygiene	*
79.	School Hygiene	–
80.	Child Literature	*
81.	Literature and Story Telling	–
82.	Story Telling	*
83.	Arithmetic Content	*
84.	Geography Content	*
85.	Nature Study Content	–
86.	Penmanship Content	*
87.	Gardening	x
88.	Library Technique	*
89.	Mother Play	*
90.	History and Civics	*
91.	General Review	0

(*) Increase (–) Decrease (0) Elimination (x) Addition

An analysis of the data presented in Table II reveals in summary the distinction between the curricular requirements in the two-year and three-year normal schools. In general, we find the following elimination and addition of subjects, and the following decrease and increase in emphasis upon subjects common to both the two-year and three-year types of curricula:

A. GENERAL CONTENT SUBJECTS
1. *Eliminations:* English Literature, Introductory Sociology, Geography, World History, and Current Events.
2. *Additions:* American Government, and General Science.
3. *Increase in Emphasis:* English Composition, Oral Expression, General Literature, American History, Political Science, Economics, European History, Physical Education, Biology.
4. *Decrease in Emphasis:* Poetry, Content Electives, prescribed; Content Electives, free.
5. *Summary:* Six subjects eliminated, two subjects added, decrease in emphasis upon three subjects, and increase in emphasis upon nine subjects. *Net results:* four subjects lost, and emphasis increased in six subjects.

B. GENERAL PROFESSIONAL SUBJECTS
1. *Eliminations:* Professional electives.
2. *Additions:* History of Education in the United States, and Educational Biology.
3. *Increase in Emphasis:* General Psychology, Educational Psychology, Child Psychology, Tests and Measurements, History of Education (general), Principles of Education, and Professional Ethics.
4. *Decrease in Emphasis:* History of Elementary Education, History and Principles of Education, School Management, Introduction to Teaching, Educational Sociology, and Principles of Teaching and General Methods.
5. *Summary:* One subject eliminated, two subjects added, decrease in emphasis in six subjects, and increase in emphasis in seven subjects. *Net results:* one subject gained, and an increase in emphasis upon one subject.

C. OBSERVATION AND PARTICIPATION
1. *Eliminations:* Kindergarten-Primary Practice.
2. *Additions:* Teaching of special subjects.
3. *Increase in Emphasis:* Introductory and advanced Kindergarten-Practice, Kindergarten Practice, Primary Practice, and Special Kindergarten-Primary Observation.
4. *Decrease in Emphasis:* General Elementary Practice.
5. *Summary:* Considerably more time is given to practice-teaching; an attempt to confine practice teaching more specifically to the kindergarten and primary grades; and the specializing of practice-teaching by adding practice-teaching in special subjects. *(The fact that this category, or general division, is increased in emphasis to a much greater extent than any other division suggests the conclusion that increased emphasis upon this division was the primary cause of the extension.)*

D. SPECIAL PROFESSIONAL SUBJECTS
1. *Eliminations:* Methods of Teaching Geography, Methods of Teaching History and Civics, Methods of Teaching Penmanship, Methods of Teaching Foreign Children, Methods of Teaching Nature Study, Methods of Teaching Physical Education.
2. *Additions:* None.

3. *Increase in Emphasis:* Kindergarten Theory, introductory and advanced; Kindergarten History and Principles, Primary Methods, Primary Curriculum, Industrial Arts Methods, Music Methods.
4. *Decrease in Emphasis:* Kindergarten-Principles, Kindergarten Curriculum, Kindergarten Methods, Arithmetic Methods, and Fine Arts Methods.
5. *Summary:* Six subjects eliminated, no subjects added, decrease in emphasis in five subjects, and increase in emphasis in seven subjects.
Net results: Loss, six subjects; increase in emphasis in two subjects.

E. SPECIAL AND TECHNICAL CONTENT SUBJECTS
1. *Eliminations:* Gymnastics, Technical Electives, Playground Supervision, and General Reviews.
2. *Additions:* Vocal Music, Gardening.
3. *Increase in Emphasis:* Music, theory; Music, appreciation; Music, piano; Art, theory; Art, appreciation; Handwork, general; Construction and Play Materials, Household Arts, Plays and Games, Child Hygiene, Child Literature, Story Telling, Arithmetic Content, Geography Content, Penmanship Content, Library Technique, Mother Play, History and Civics Content.
4. *Decrease in Emphasis:* Music Content and Methods, Art Content and Methods, School Hygiene, Nature Study Content, Literature and Story Telling.
5. *Summary:* Four subjects eliminated, two subjects added, decrease in emphasis in five subjects, and increase in emphasis in eighteen subjects.
Net results: Loss, two subjects; increase in emphasis in thirteen subjects.

The detailed data described above indicate two significant facts. First, they corroborate quite conclusively the general conclusion that the primary purpose of the three-year curriculum is an extension of the two-year curriculum in time spent upon practically the same subjects. Second, these data show that, with the possible exception of practice-teaching, no marked changes are made by addition of subjects, in any of the five divisions.

A general summary of the facts presented in Table II show just as clearly, if not more so, that the three-year curriculum is primarily an extension of the two-year curriculum in respect to time. The subjects given by the two types of schools make a combined list of ninety-one subjects. Of these ninety-one subjects, sixty-seven are found in both curricula; eighteen are found in the two-year curriculum that are not found in the three-year curriculum; while only seven are found in the three-year curriculum that are not found in the two-year curriculum. In forty-eight subjects, the three-year curriculum showed an increase in emphasis; in nineteen subjects, there is a decrease in emphasis. Thus, it is quite obvious that the three-year curriculum is designed primarily to give greater emphasis to subjects already included in the two-year curriculum rather than to add new subjects.

IS THE ADDITIONAL YEAR JUSTIFIED?

In view of the fact that the three-year curriculum represents primarily an extension of the two-year curriculum in time given to the

same, or similar subjects, the answer to the above question must naturally depend upon the adequacy of the types of courses given. Such a promise would necessitate a critical examination of the subjects now provided for teacher-preparation. Fortunately, the writer quite recently made such an examination. It is quite obvious, however, unfortunate, that a detailed resume of that study cannot be given here. We can and will, indicate in general outline the procedure and results of that investigation.

In general, the problem involved, in the above study, was to determine *objectively* the needs of kindergarten-primary teachers. The needs of this type of teacher were ascertained through "job-analysis." As an indication of what such a teacher needed to know, and be able to do, two procedures were followed: first, an analysis of the best kindergarten-primary courses of study in the public schools was made; second, an analysis was made of the difficulties encountered by kindergarten-primary teachers. As a basis of comparison, an analysis of the curricula of teacher-training institutions preparing kindergarten-primary teachers was made. A comparison of what is now being done with what the "job-analysis" showed ought to be done, gave the basis for the answer to the present question under discussion. I shall give a summary quotation as set forth by the investigator in his conclusion.

"A critical examination of the needs of the teacher on this level shows that a three-year curriculum is desirable. The additional year is justified, however, not on the basis upon which it has been prescribed by present practice, but rather on the basis of a number of modifications (in the form of the addition of new subjects) necessary in the two-year curriculum. The data have shown the necessity of special methods courses in the teaching of at least thirteen subjects. In addition two "General content" courses have been found desirable as well as six "General professional" subjects including "Observation and participation." Furthermore, it was noted that more time probably should be given to practice-teaching. In all, some twenty subjects exclusive of practice-teaching have been indicated as a necessary part of the teacher's preparation. It is practically impossible to conceive of these subjects being given in two-years. Thus, it has been suggested that the course be lengthened to three years."[3]

[3] Thompson, C. H. "Objective Determination of a Curriculum for the Training of Kindergarten-Primary Teachers." An unpublished doctors dissertation (1925), University of Chicago, Chicago, Ill.

While the conclusion of the study quoted above may not be obviously conclusive, it does raise, quite pointedly and validly, the question whether or not present practice is justified in emphasizing a scheme of preparation, the basis of which has not been justified by objective considerations. In other words, and more specifically, the fact that the three-year curriculum is merely an extension of the two-year curriculum in time, and the fact that the two-year curriculum was not determined by any systematic objective considerations, seem to lead one to agree with the conclusion stated above. At least, it raises the question whether it would not be very profitable to make such an analysis before our present extension goes much further.

GENERAL CONCLUSIONS

1. The facts as presented and discussed here show that the three-year curriculum for the specific preparation of kindergarten-primary teachers is primarily an extension of the two-year curriculum in time spent upon subjects already in the two-year course. There is no definite indication that it is the purpose to include new subjects, or to change the general direction of preparation on this level. Only seven new courses out of ninety-one are added by the three-year curriculum that are not already included in the two-year curriculum.

2. The facts of this study show that the justification of the additional year is dependent upon the validity of the present two-year curriculum. Reference was made to a recent study of the needs of kindergarten-primary teachers which pointed out that the present two-year curriculum needed a modification in the form of new subjects. It is the conclusion of this discussion that whether such a conclusion is obviously evident, it does indicate that our present extension should be halted until such examinations have been made on a more extensive scale.

THE PREDICTION OF SCHOLASTIC SUCCESS BY MEANS OF CLASSIFICATION EXAMINATIONS

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CAN classification examinations be relied upon to predict a student's chances of scholastic success or failure in a Teachers College? Can student mortality be lessened by the judicious use of such tests? What type of test is most effective for these purposes?

In an attempt to help solve these and other similar problems which arise to perplex the administrators of a professional school, the Department of Educational Research of Colorado State Teachers College is conducting a continuation study of each class that has entered the school since the fall of 1926.

During freshman week each entering student is given three examinations. One, the Thurstone Psychological Examination, is used purely for matriculation and classification purposes. An achievement test[1] is used to supplement the classification examination, helping to determine student teaching assignments, and serving to some extent at least, as a basis for guidance work. The third, an English test,[2] is used as a basis for exemption from elementary English courses.

Since the variables were slightly more reliably controlled during the year 1927-28 than during the previous year (1926-27), this paper will be concerned only with the freshmen entering the college in September, 1927. However, the data for the two years are very similar.

The Thurstone Psychological Examination, 1926 edition, was given to the 559 prospective students who applied for admission in September, 1927. Their median score was 51.23 with a quartile deviation of 13.22, indicating that this was a fairly normal entering group of students and should be expected to do average work in college.

Since the college uses a five-letter grading system, scholastic ratings computed by the Kappa Delta Pi scale (where A = 5, B = 4, C = 3, D = 2, and F = 1) should yield a theoretical average of 3.00. In Table I the median ratings and quartile deviations are shown by quarters. These are all quite close to the theoretical average of 3.00.

[1] Whitney, F. L., Heilman, J. D., and Woody, W. H. *Entrance and Classification Examination for Teachers Colleges, Elementary Section.* Greeley: Colorado State Teachers College, 1928.

[2] Cross, E. A., and Pooley, R. C. *The Cross-Pooley English Test.* Examination Form D, Experimental Edition. Greeley: Colorado State Teachers College, 1928.

A reliable picture of the effect of intelligence (as measured by the Thurstone test) upon scholarship is given in Table II where the approximate average scholarship is given by deciles of intelligence scores. Here it is evident that average scholarship increased quite regularly from low to high intelligence as shown by the difference of approximately one letter grade between the first and tenth deciles of Thurstone scores. The slightly higher average of the lowest decile is the only instance where this is not true. However, it is likely that the Thurstone test might not have yielded as reliable results in the lower reaches, thus helping to create this situation. Also, the students in the lower level were either warned that their low scores tended to predict low scholarship or were put on probation. Either of these conditions may have caused the students in this low decile of intelligence to put forth greater effort.

TABLE I

MEDIAN SCHOLASTIC RATINGS AND QUARTILE DEVIATIONS OF THE FRESHMAN CLASS OF 1927-28 AT COLORADO STATE TEACHERS COLLEGE

PERIOD OF TIME	MEDIAN SCHOLASTIC RATING	QUARTILE DEVIATION
Fall quarter	3.00	0.40
Winter quarter	3.07	0.43
Spring quarter	3.14	0.33
Average for the academic year	3.05	0.36

TABLE II

AVERAGE SCHOLASTIC ACHIEVEMENT OF 559 COLORADO STATE TEACHERS COLLEGE FRESHMEN BY DECILES OF INTELLIGENCE SCORES MADE ON THE THURSTONE PSYCHOLOGICAL EXAMINATION, 1926 FORM, FOR THE ACADEMIC YEAR, 1927-28

DECILES OF INTELLIGENCE SCORES	Approximate average for the year	ITEMS Approximate chances of a student falling in: Highest fifth in scholarship	Upper half in scholarship	Lowest fifth in scholarship
First	2.67	1 in 15	1 in 4	1 in 2
Second	2.57	1 in 51	1 in 6	1 in 2
Third	2.66	1 in 16	1 in 3	1 in 3
Fourth	2.79	1 in 18	1 in 3	1 in 4
Fifth	2.94	1 in 8	1 in 3	1 in 5
Sixth	3.11	1 in 6	1 in 2	1 in 7
Seventh	3.18	1 in 4	1 in 2	1 in 17
Eighth	3.23	1 in 4	1 in 2	1 in 13
Ninth	3.36	1 in 3	1 in 1	1 in 21
Tenth	3.58	1 in 2	1 in 1	1 in 26
Total	3.03			

The approximate chances, which a student with a certain decile of intelligence has of falling within certain levels of scholarship, are also shown in Table II. Students with Thurstone scores which fall within the first decile have about 1 chance in 15 of attaining a scholastic rating which would rank among the highest fifth. These same students have 1 chance in 2 of attaining the lowest quintile of scholarship, while students in the tenth decile of intelligence have only 1 chance in 26 of

falling so low. These latter students have 1 chance in 2 of attaining the upper fifth.

At first glance one might be led to believe that even such indicative proportions are not high enough and that in every instance, the student with the highest intelligence should invariably attain highest scholarship. This attitude would not account for two pertinent factors. In the first place students put forth varying amounts of effort and have other variable personal qualities which effect the grades they receive. It may be possible in the future to measure these personal factors with reliable character and aptitude[3] tests and thus increase the reliability of prediction. Another factor closely interwoven with this first, is the fact that some students have special aptitudes in which they excel although this excellence is not measured by the Thurstone test. The student may take most of his work in this favored field and thus exceed the prediction of the intelligence test.

Another interesting method of viewing the reliability of the intelligence test is by tabulating the scholastic ratings in terms of deciles of intelligence. The results of this make a figure too extensive for this paper but they may be summarized briefly. About 16 percent of the students received a rating which fell in the same decile as their intelligence score decile (e.g. fourth decile in scholarship and fourth decile in intelligence); about 38 percent exceeded expectations (e.g. fifth decile in scholarship and third in intelligence); and about 46 percent fell below the expected decile of scholarship. On the surface, this would seem to indicate that the intelligence score is nearly valueless. However, the data reveal the fact that 42 percent of the entire group either fell within the same deciles in both intelligence and scholarship or were displaced no more than one decile either way. This means that if a student secures an intelligence score in the fifth decile, roughly speaking, he has 4 out of 10 chances of falling in the fourth, fifth, or sixth decile in scholarship.

Using the Thurstone test as the independent variable and scholarship as the dependent variable and writing the regression equation, we find a probable error of the estimate of $\pm .34$ on scholarship based on the five-point scale with a theoretical average of 3.00. This means that for one-half of the students the error of prediction will not be more than .34 of a step in a five-point system of grading.

[3] Hertzberg, O. E., and Whitney, F. L. *Professional Aptitude Test for Elementary and Junior High School Teachers.* Greeley: Colorado State Teachers College, 1929.

A prediction for a random sampling of 50 students was made on the basis of the Thurstone scores. The average error of prediction was ±.36 of a step in a five-point system closely resembling the probable error.

Prediction by means of the achievement test yields results very similar but slightly more reliable than those obtained when the Thurstone test is used. The intercorrelations represented in Table III bear out this fact, as it is seen that the coefficients of relationship between scholastic ratings and the achievement test run slightly higher than do those of the Thurstone test and ratings. While the difference is not great, the consisteney of the relative superiority of the achievement test is marked.

In the regression equation, the probable error of the prediction by means of the achievement test is ±.33, while the actual average error of prediction on the same random sampling of 50 students is ±.35.

When the Thurstone and achievement tests are combined as predictive agencies, there is no added advantage over either used alone, as the probable error of prediction is ±.36 while the actual average error of prediction is ±.33.

TABLE III

INTERCORRELATIONS AMONG THURSTONE TEST SCORES, ACHIEVEMENT TEST SCORES, AND SCHOLASTIC RATINGS AT COLORADO STATE TEACHERS COLLEGE FOR THE ACADEMIC YEAR, 1927-28

	INTERCORRELATIONS			
TEST	Fall scholastic rating	Winter scholastic rating	Spring scholastic rating	Average scholastic rating
Thurstone test	.4169 ±.0136	.3706 ±.0275	.3934 ±.0276	.4543 ±.0232
Achievement test	.4610 ±.0225	.4206 ±.0263	.4387 ±.0301	.4979 ±.0221

The mortality record shown in Table IV indicates that the students with low native ability are those who drop out of school. Thus, of 129 students who failed to complete one year's work, 22.5 percent had Thurstone scores less than 27 which placed them in the lowest decile. The two lowest deciles account for nearly 40 percent of the total mortality. If the three lowest deciles are considered, it will be seen that they account for over 54 percent of the total loss.

In summing up these data, conclusions appear which have a definite bearing on the three questions set up as an introduction. Of course these are moot questions which can only be definitely answered by extensive research of a much more comprehensive nature than this beginning.

1. Can classification tests be relied upon to predict a student's chances of scholastic success or failure in a teachers college? Scholar-

ship can be predicted by means of the Thurstone Psychological Examination or the Elementary Section of the achievement and classification examination within one-third of a letter grade on a five-letter system for one-half of the students. Such prediction may not seem very close, but it certainly is much superior to theoretical bases for guidance. Its inaccuracy points out the need for reliable character and aptitude tests to supplement present means.

TABLE IV

THE MORTALITY RECORD ACCORDING TO INTELLIGENCE TEST SCORES OF 559 COLORADO STATE TEACHERS COLLEGE FRESHMEN DURING THE ACADEMIC YEAR, 1927-28

DECILES OF THURSTONE SCORES	ITEMS	
	Number of students dropping out of school	Proportion of total mortality
First	29	22.5
Second	22	17.0
Third	19	14.7
Fourth	9	7.0
Fifth	9	7.0
Sixth	12	9.3
Seventh	10	7.8
Eighth	7	5.4
Ninth	8	6.2
Tenth	4	3.1
Total	129	100.0

2. Can student mortality be lessened by the judicious use of such tests? An answer here involves administrative opinion as well as further scientific investigation. However, the data show that the large proportion of mortality occurs among the students with low intelligence scores. This suggests two avenues of procedure. Entering students who obtain low classification scores might profitably be acquainted with their approximate chances for success or failure. This would, in many instances, spur the ambitious on to greater effort and ultimate success. Or, the administration might employ the tests as a basis for excluding those not attaining a score high enough to predict scholastic success to a reasonable degree of certainty at least.

What type of test, purely psychological or achievement, is most effective for purposes of classification and guidance? From the data accumulated in this study, it appears that a reliable achievement test yields as good results for classification purposes as does a psychological examination. The reason for this probably lies in the fact that an achievement test involves both intelligence and application, while the psychological examination does little more than measure the abstract type of native endowment.

THE CORRELATION OF LABORATORY AND CLASSROOM WORK IN THE TEACHING OF HIGH-SCHOOL CHEMISTRY

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THE PROBLEM

THE purpose of this study is to compare the relative efficiency of three methods of correlating classroom and laboratory work, in the study of high-school chemistry, as measured by immediate and delayed recall of subject matter. It will be seen that the methods vary with relative time of class and experiment; but that other factors were kept as nearly constant as possible. The three procedures are indicated as: method 0, method 1, and method 2. By method 0, the experiment preceded the class work; by method 1, a one day pre-view of the topic was made before the experiment; by method 2, all class-room work was completed before the laboratory period. The study will attempt to present answers to the following questions:

1. Will the pupil learn more effectively if he does the experiment and then studies in related subject matter than if he is given a pre-view of the topic in class and then works on the experiment?

2. Will the pupil do better if he thoroughly covers the work in class before he does any laboratory work?

3. Which method is most efficient in instructing pupils of differing degrees of intelligence?

Science teachers will agree probably that in beginning natural science courses, such as are found in the ordinary high school, the classroom and laboratory work should be definitely interrelated; that is, on any given topic the two should run parallel, or at least one should follow the other quite closely. The committee on Chemical Education of the American Chemical Society, published in 1924[1] a Standard Minimum High-School Course in Chemistry. One of the principal teaching objectives of this course is: "To develop a careful correlation between recitation and experiment." Whether the recitation should be followed by the experiment or whether it is desirable to reverse the order is not stated.

METHOD

In September, 1926, there were 450 juniors and seniors enrolled in the chemistry department of the Flint, Michigan, High School. Three

[1] *Journal of Chemical Education*, May, 1924.

groups of thirty pupils each were chosen by the writer from this enrollment for the study. The groups were equated according to chronological age and general intelligence. The rotation equivalent group-method, which was considered adaptable to the experiment, was followed. Objective tests were given at the beginning and at the close of the study the results were used as bases for conclusions regarding the relative efficiency of the three methods.

The classes were designated as A, B, and C. Class A came the first hour in the morning; class B, the second hour; while class C came immediately after the lunch hour. These periods were chosen in order to avoid whatever teacher and pupil fatigue may have accompanied periods at the end of the session.

The school year was forty weeks long with approximately one week lost in getting under way in September and finishing in June. This left thirty-nine weeks to be divided into three rotation periods of thirteen weeks each. At the end of the first period class A began work by class B method, class B by class C method, etc. The plan was devised to include three methods; method 0, no class work before laboratory; method 1, a one day pre-view in the class before laboratory; and method 2, a completion of the topic in the classroom followed by the experiment. During the thirty-nine weeks all three methods were applied to each class. Standardized tests and objective tests made by the writer were used to measure progress. All of the pupils had been required to take the equivalent of one and one-half years of general science in the junior high school, and most of them had elected a year in biology upon entering the senior high school. Considerable knowledge of chemistry was picked up before the pupils enrolled in this course; therefore, the Powers General Chemistry Test was given the first day, and on the second day Gerry's Tests of High-School Chemistry were given.

At the end of the first thirteen weeks the groups were again given the Powers and Gerry tests, and then the classes were rotated. The initial score was subtracted from the number of points earned, which left the net gain that accrued from the first one-third of the school year for each pupil. The same testing process was repeated at the conclusion of each thirteen weeks. The score was measured in terms of gains, or G, for each type, G = FT — final test minus IT = initial test; G includes the total gains made on both Powers and Gerry tests.

Since these tests were administered with periods of more than three school months intervening in each case, the results may represent delayed

response. Other objective examinations to test immediate recall were, of course, necessary.

The writer's own tests, totaling something over 500 questions based upon experiment and recitation, were used as supplementary testing material. Class B followed class A into the recitation room with only a four-minute interval between classes. The same tests were used for each of these groups. Class C, however, had lunch hour intervening. This made it necessary to give an additional form of the same test each time. Care was taken to construct questions of the same type and number to make the two tests equivalent. Multiple response, matching sets, and completion exercises, with an occasional true-false set, were used.

All classes did the same experiment and used the same materials. The only variation permitted in the various groups was the one necessitated by the change in the time of class and experiment. The number of pupils dropped from an original thirty in each class to twenty-four at the end of the school year. The following tables summarize the results:

TABLE I

THE MEANS AND STANDARD DEVIATIONS OF THE DISTRIBUTIONS OF GENERAL INTELLIGENCE AND CHRONOLOGICAL AGE

Group	No. of Cases	Chronological Age		General Intelligence	
		Mean	S. D.	Mean	S. D.
A	24	201.50	8.30	105.66	8.62
B	24	203.3	12.75	104.75	6.92
C	24	201.46	11.70	106.16	8.52

No actual pairing was done for three classes, since the mean distributions and S D's for chronological age and general intelligence were very nearly the same. Groups were considered equivalent when the formula

$$\frac{M_1 - M_2}{\sqrt{\left(\frac{SD_1}{\sqrt{N_1}}\right)^2 + \left(\frac{SD_2}{\sqrt{N_2}}\right)^2}}$$

was applied and resulting quotients were between 0 and 1. In no case did the difference exceed .63.

TABLE II

SUMMARY OF TEST AVERAGES AND STANDARD DEVIATIONS FOR THE THREE METHODS

Method	Writer's Tests		Powers and Gerry Tests	
	Average of Means	Average of S D's	Average of Means*	Average of S D's
0	72.01	12.12	29.38	6.81
1	69.12	11.45	27.90	5.42
2	69.83	11.76	29.54	6.60

*These means are based upon gains each successive rotation period and are not means of scores. The true mean for each method is lower by 15 than the mean here.

DEVIATIONS FROM AVERAGE MEANS ACCORDING TO VARYING NATIVE ABILITY OF PUPILS

In order to determine whether any of the three methods was distinctly superior for instructing pupils of certain groups assembled according to mental ability, the deviations from the average means upon the various tests for each method were determined for each student.

The pupils mental scores were arbitrarily divided into three groups: Low IQ, including the 23 pupils below 100; Medium IQ, the 31 cases from 100-110 inclusive; and High IQ, the 18 pupils above 111. In Table III will be found the average deviations from the means of the pupils of IQ below 100; of those of IQ 100-110; and of those above 110.

TABLE III

AVERAGE DEVIATIONS FROM THE MEANS OF WRITER'S TESTS AND POWERS AND GERRY TESTS MADE BY PUPILS OF LOW, MEDIUM, AND HIGH IQ'S

	Writer's Tests			Powers and Gerry Tests		
Method	0	1	2	0	1	2
Means	72.01	69.12	69.83	29.38	27.90	29.54
A. D.–Low	−6.33	−5.34	−7.25	−1.55	−2.30	−2.10
A. D.–Med.	−1.43	0.33	−1.21	−.05	−.20	−1.09
A. D.–High	10.60	7.10	11.70	2.06	.82	4.79

If the interest factor, as indicated in efficiency of teaching, plays any large part in the learning process the results from method 0 (in which the experiment preceded the class) and method 1 (one day in class which preceded the laboratory work) should more nearly approximate each other than any other combinations. In neither case were the pupils told the results of the experiment preceding the laboratory work.

By referring to Table II, it will be seen that method 0 has an average mean of 29.37 for Powers and Gerry tests; method 1, a mean of 27.90; method 2, a mean of 29.54. The net gain of method 0 over method 1 = 1.48 or 5.30 percent; the net gain of method 2 over method 0 = .16 or .55 percent; the net gain of method 2 over method 1 = 1.64 or 5.80 percent.

Method 0 for writer's tests has an average mean of 72.01; method 1, mean 69.12; method 2, mean 69.83. (See Table II.)

Method 0 for writer's tests shows slightly better results than method 1 or 2 for groups A, B, and C.

The net gain of method 0 over method 1 = 2.89 or 4.18 percent; the net gain of method 0 over method 2 = 2.18 or 3.12 percent; the net gain of method 2 over method 1 = .71 or 1.01 percent.

When the formula

$$\frac{M_1 - M_2}{\sqrt{\left(\frac{SD_1}{\sqrt{N_1}}\right)^2 + \left(\frac{SD_2}{\sqrt{N_2}}\right)^2}}$$

was applied none of the resulting quotients exceeded .93.

For the medium group, method 1 is superior to method 0 by a deviation of 1.10, while method 1 is better than method 2 by .88.

For the high group, method 0 exceeds method 1 by 3.50 and method 2 is better than 1 by 4.60.

By reference to Table III it will be seen that the Powers and Gerry tests show somewhat the same results.

CONCLUSIONS

In the teaching of high school chemistry it seems:

1. That a change in the relative time of class and experiment has little effect upon pupil achievement.

2. That telling the results of an experiment before working it out in the laboratory does not appreciably affect what the pupil learns as measured by two standardized tests.

3. That for purposes both of immediate and delayed recall, pupils having low or medium intelligence might profit slightly more by the following procedure: utilize the first day for class discussion; the second for the experiment; the third for class work.

4. That pupils of high intelligence do better work both in immediate and delayed recall by either completing the subject matter in the class room before going into the laboratory or by doing the experiment before having any class work whatever.

AN IMPROVED METHOD OF DETECTING CHEATING IN OBJECTIVE EXAMINATIONS

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IN a recent issue of *School and Society*[1] the writer outlined a method of detecting dishonesty in objective examinations. Since this publication appeared, further experimentation has yielded a more accurate and more easily applied method of detection, the evolution of which is herein described, together with certain reflections upon the problems originating in the practice of cheating.

DESCRIPTION OF EXTENSIVE EXPERIMENT

At the close of the Fall Quarter, 1926, two different objective examinations were given to 945 students who completed the first half of the General Psychology course, that is, 527 students took examination form A and 418 students had examination form B. It was decided in advance of the examinations to estimate the extent of cheating so that, for purposes of locating each student's position in the examination hall, every paper was clearly marked on the top of the front page with its section, row, and seat number. Some of the students were advised of the method of detection we had used to supplement the reports of the proctors, while others were kept ignorant of it. These groups we shall designate as the 'warned' and 'not warned' groups; their location and size is indicated in Table I. In brief, the specific instructions given to

TABLE I

SCHEMATIC OUTLINE OF EXAMINATION CONDITIONS

Group No.	Examination Form	Place	Instructions	No. of Students
I.	A	Music Aud.	Warned	227
II.	A	Old Library	Not warned	300
III.	B	Music Aud.	Not warned	190
IV.	B	Old Library	Warned	228

455 examinees made it clear that knowledge of the contents of another paper would increase the number of identical errors in two papers beyond a chance value and that we would check every adjoining pair of papers to determine the actual error identities. It was understood that an excessive number of identical mistakes, in comparison with random samples, would be construed as indicative of dishonesty. Finally, these students were cautioned to avoid even the appearance of looking at an-

[1] Bird, C. "The Detection of Cheating in Objective Examinations." *School and Society*, XXV, (1927), pp. 261-262.

other paper. Those not informed of the method of detection were advised to attend to their own examination blanks only. It should be apparent that all examination groups received at least the minimum instructions to attend strictly to their own papers. Furthermore, in each examination hall there were eight proctors, whose functions were known to all present.

Preceding the date of the examinations the proctors were informed about the rules governing their duties, and were advised to report only those persons who persistently looked at another paper. Great care was taken to inform these members of the instructional staff that a casual glance or merely looking away from an examination blank was not to be interpreted as a sign of dishonesty. They were also instructed to have their observations checked by at least one other proctor and to indicate on specially prepared forms whether their suspicions were or were not confirmed. These proctors assuredly did not anticipate the need of reporting anyone, because of the very clear designation of seat numbers on the papers, yet they were unusually alert throughout the examination period. Upon the basis of their reports and the evidence derived by comparing identical errors, *twenty-nine* students were referred to a disciplinary committee. We shall now consider this internal evidence.

DETECTION METHOD I—THE GENERAL RANDOM SAMPLE

The two examination forms contained forty-nine multiple choice questions, thirty-six analogies, twenty matching questions, and seventy-eight completion questions. After they were scored, the papers of the suspected students were compared with the papers from which information was supposed to have been obtained in order to determine the number of like errors in the two papers. These errors were tabulated to show at a glance the number in each part of the test and the total for the whole examination. *Omissions were not counted as errors.* Our next step was to establish chance values through the tabulation of the identical mistakes in two hundred and fifty pairs of geographically separated papers. Two similar samples were derived since it was possible that the questions in forms A and B were not equally subtle, although every attempt was made to make them comparable or of equal difficulty. So far, then, the method is similar to the one previously published,[2] only more extensive random samples were obtained to increase certainty in view of the larger number of suspected students involved.

[2] *Op. cit.*, page 262.

Table II represents the number of identical errors in the papers of the suspects when compared with the papers of their neighbors, and shows for comparison the means and the ranges of the identical wrong answers in the random sample. Of the 527 students who had examination form A, 300 of whom were ignorant of the method of detection,

TABLE II

THE NUMBER OF IDENTICAL ERRORS IN THE PAPERS OF SUSPECTED STUDENTS WHO TOOK EXAMINATION FORM A

				Mult. Choice	Analogies	Matching	Comp.	Total	S. D. of Dist.
General	Random	Sample	Mean	3.5	3.1	.57	1.2	8.38	3.38
General	Random	Sample	Range	0–10	0–9	0–3	0–6	1–18	
	Not Warned								
Suspect	Grade	Neighbor	Grade						
1	F	1	D	*12*	*16*	1	3	*32*	
2	C	1	D	6	3	*6*	5	*20*	
		2	B	6	4	*11*	*8*	*29*	
3	C	1	B	5	1	*12*	2	*20*	
4	B	1	B	4	6	3	*9*	*22*	
5	C	1	D	9	9	2	0	*20*	
6	D	1	C	*12*	7	*8*	2	*29*	
7	D	1	D	*11*	*8*	1	6	*26*	
		2	F	*14*	6	1	2	*23*	
8	C	1	C	9	9	0	4	*22*	
		2	C	9	7	*5*	2	*23*	
9	F	1	D	7	*12*	0	4	*23*	
10	D	1	F	*14*	3	1	0	18	
11	C	1	F	5	4	0	3	12	
		2	C	6	6	2	5	*19*	
	Warned								
12	D	1	C	9	5	1	9	*24*	
		2	D	*11*	2	0	4	17	
		3	F	10	4	1	0	15	
		4	C	7	6	2	4	*19*	
13	B	1	D	5	7	2	3	17	
		2	F	7	7	0	0	14	

Italicized numbers exceed the upper limits of the Random Sample Distribution.

there were *thirteen* suspected of dishonesty. Actually twenty-one pairs of papers were involved, seven students being suspected of looking on one other paper, five of obtaining information from two papers, and one of supplementing his own knowledge by borrowing surreptitiously from four papers. Ten of the thirteen students lacked knowledge of the method employed to uncover deception, but of the other three possessing such knowledge two were involved with two papers and one with four papers. The habit of cheating apparently has a long history, or else some individuals resort to it because of behavior disturbances which have immediately preceded the examination. Interviews with students showed the latter are exceptional but possible bases of dishonesty.

The marked degree to which identical errors are increased by cheating is made clear through a comparison of the average of the random sample with that of the group of suspects. The mean of the random sample is 8.38 ± 3.38[3] identical errors while the mean of the suspected

[3] The measure of variability is the S.D. of the distribution.

group is 21.1 ± 4.9 identical errors. Only two suspects had papers in which the total errors failed to exceed the upper limit of the random sample, and one of these equalled this limit, while the other, involved with two of his neighbors, had but one less identical wrong answer. Even the student involved with one paper would find it difficult to project his delinquency upon chance, for on one part of the test the identical mistakes are far in excess of the upper limit of the corresponding section in the random sample. We note, therefore, that the method described very frequently indicates in which section of the examination the score is distorted most by dishonesty.

In addition to the aforesaid suspects *sixteen* of the 418 students who took examination form B were also reported by proctors. Eight of these were observed looking on one other paper, seven at two papers, and one at three papers. All but four of these students knew their papers would be checked for identical errors, but this knowledge appears to have been effective in curtailing rather than in eliminating cheating. If Table III, which shows the distribution of the errors in the papers of these students, is compared with Table II, it will be found that more papers in the

TABLE III

THE NUMBER OF IDENTICAL ERRORS IN THE PAPERS OF SUSPECTED STUDENTS WHO TOOK EXAMINATION FORM B

				Mult. Choice	Analogies	Matching	Comp.	Total	S. D. of Dist.
General	Random	Sample,	Mean	3.42	3.05	.54	.88	7.7	3.4
General	Random	Sample,	Range	0–10	0–10	0–4	0–4	1–18	
	Warned								
Suspect	Grade	Neighbor	Grade						
1	B	1	F	4	5	0	5	14	
		2	C	4	5	0	0	9	
2	C	1	D	4	5	2	3	14	
		2	C	3	4	2	5	14	
3	C	1	D	8	8	6	4	*26*	
4	D	1	C	8	8	9	4	*29*	
5	C	1	F	5	4	1	1	11	
		2	C	5	5	2	2	14	
6	C	1	C	7	4	2	4	17	
7	F	1	C	3	6	0	2	11	
		2	F	5	8	1	0	14	
8	C	1	C	5	1	0	2	8	
		2	C	7	6	0	2	15	
9	C	1	C	6	6	1	1	14	
		2	C	2	10	3	3	18	
		3	C	3	10	2	2	17	
10	D	1	C	6	6	7	7	*26*	
11	D	1	C	5	6	2	2	15	
		2	C	6	8	2	2	18	
12	C	1	C	5	4	1	3	13	
		2	C	3	6	1	1	13	
	Not	*Warned*							
13	D	1	D	8	8	0	3	*19*	
14	C	1	B	5	8	2	3	18	
15	D	1	B	3	2	6	5	16	
16	D	1	C	6	4	5	1	16	

Italicized numbers exceed the upper limits of the Random Sample distributions.

former contain total errors of a magnitude less than the upper limit of eighteen in the random sample. The mean of this random sample is 7.7 ± 3.4 identical wrong answers and that of the group of suspects is 16.1 ± 4.6 identical errors. Of the eight papers belonging to persons suspected of looking on one other blank, there are six with a number of errors exceeding the upper limits of the separate parts or of the total of the random sample; and the other two have a number of identical errors corresponding to the upper two percent of the random sample. Little doubt about the implication of the students involved with two or more papers exists since a perusal of their examinations showed that on several pages most of the errors were identical with either one or the other paper. It is not the function of this paper to consider the decisions of the disciplinary committee; but we may note that four of the sixteen students, three involved with two papers and one having but fifteen identical errors, were dismissed with no other penalties than those inhering in a review of their conduct.

Of the total twenty-nine students referred to a committee there were six who denied the charges of dishonesty, but only two of these had papers with a number of identical mistakes which did not exceed the upper limits of the chance distributions. It is essential, if misunderstanding is to be avoided, to remember that all the suspects were reported by at least two proctors for violating the rules of the examinations and that the internal evidence which has been reviewed was supplementary to the proctors' observations.

DETECTION METHOD II—LETTER-GRADE RANDOM SAMPLES

In the process of experimenting with Method I we discovered that the number of identical errors occurring in two geographically separated papers depended somewhat upon the letter grades compared, or specifically, upon the number of wrong answers in them. Thus papers graded A when compared with each other generally had fewer identical errors than papers marked F, or failure. So we compared for each examination form, and for all pairs of letter grades, such as AB, AF, CD, or DF, fifty pairs of geographically separated papers, with the exception of CC grades, where, because of the greater frequency of these grades, one hundred pairs were used. Since the examinations were marked on a five step basis, namely A, B, C, D and F, fifteen letter-grade combinations existed; so to obtain new random samples eight-hundred pairs of papers were compared for each examination form. In Table IV, which

shows the means of the total errors for letter-grade random samples, the relationship between identical errors and the number of wrong answers is made clear. These random samples afford a more selective basis for

TABLE IV

TOTAL IDENTICAL ERRORS IN LETTER-GRADE RANDOM SAMPLES FOR EXAMINATION FORMS A AND B

Form A					Form B				
No. of Pairs	Letter-grade	Mean.	S.D. of Dist.	Range	No. of Pairs	Letter-grade	Mean.	S.D. of Dist.	Range
50	A – A	4.28	1.91	1–11	50	A – A	4.46	2.08	1–9
50	A – B	4.76	1.85	1–10	50	A – B	4.86	2.21	1–10
50	A – C	5.22	1.87	1–8	50	A – C	5.22	2.36	0–11
50	A – D	5.4	2.34	1–10	50	A – D	5.34	2.41	1–12
50	A – F	5.76	2.5	1–12	50	A – F	4.58	2.15	0–9
50	B – B	6.7	2.35	1–13	50	B – B	5.6	2.06	1–10
50	B – C	8.72	2.4	4–14	50	B – C	7.24	3.09	1–16
50	B – D	7.76	2.88	2–15	50	B – D	7.22	2.96	2–15
50	B – F	7.42	2.46	2–14	50	B – F	6.58	2.26	2–11
100	C – C	8.48	3.04	3–17	100	C – C	8.27	2.96	3–15
50	C – D	10.14	3.34	4–16	50	C – D	9.42	2.8	5–18
50	C – F	9.8	3.04	5–18	50	C – F	9.38	2.86	4–16
50	D – D	10.72	3.33	4–19	50	D – D	11.94	2.94	5–19
50	D – F	12.24	4.4	4–24	50	D – F	11.76	3.68	6–20
50	F – F	12.46	3.89	4–23	50	F – F	12.3	3.62	6–22

determining whether or not two adjacent papers have identities due to deception if we accept as a criterion of deception a number of errors in proximate papers in excess of the upper limits of the chance distributions. We found in the group of twenty-nine suspects that more papers had identical errors exceeding letter-grade limits than exceeding the upper extremes of the general random samples. On the other hand, we also discovered that letter-grade samples, being concentrations of papers of equal merit, are more likely to establish the greatest number of identical mistakes to be expected by chance. Thus, for example, in the original random samples, in which letter-grades compared was a matter of chance, the greatest number of identical mistakes in two papers was eighteen, which number occurred in FF papers, but a concentration of fifty geographically separated FF papers yielded one pair with twenty-three and one with nineteen identical errors for examination A, and for examination B one pair with twenty-two and another with twenty identical mistakes. In contrast, comparisons of AA papers show a marked reduction of these errors, the upper limit being eleven in form A and nine in form B. For experimental purposes, that is for estimating the extent of cheating in the absence of the observations of proctors, letter-grade random samples are superior to those in which no such selection is made.

DETECTION METHOD III—APPLICATION OF LETTER-GRADE SAMPLES TO PARTICULAR CASES

The reader may object that both methods just described require too much time to apply, and we must admit the validity of the criticism. Yet the letter-grade random samples, because of their increased selectivity, suggest a modification which requires only a short time to apply but which, nevertheless, is very reliable. We may elucidate this short method of detecting deception by reference to three cases of dishonesty, the only students reported in the winter mid-quarter examinations when 822 of the group of students referred to in Table I were present. The papers of these students were first compared with the neighbor's paper and then with ten other geographically separated papers of a numerical grade equal to that of the neighbor. If the paper from which information had been gained was graded C, then the suspect's paper was checked against ten other C papers. An actual comparison is presented in Table V. The total number of comparisons required to substantiate, as it happened,

TABLE V

AN ACTUAL CASE ILLUSTRATING THE SHORT METHOD OF COMPARING THE PAPER OF A SUSPECT WITH TEN SELECTED PAPERS EQUAL IN GRADE TO THE NEIGHBOR'S PAPER

		Mult. Choice	Analogies	Matching	Comp.	Total
Suspect Grade C Neighbor Grade C		6	2	0	5	13
Suspect Grade C Selected C Paper	1	2	0	0	0	2
Suspect Grade C Selected C Paper	2	1	2	1	0	4
Suspect Grade C Selected C Paper	3	4	3	1	0	8
Suspect Grade C Selected C Paper	4	4	1	1	1	7
Suspect Grade C Selected C Paper	5	4	4	0	0	8
Suspect Grade C Selected C Paper	6	3	1	1	1	6
Suspect Grade C Selected C Paper	7	2	3	1	0	6
Suspect Grade C Selected C Paper	8	5	1	1	0	7
Suspect Grade C Selected C Paper	9	3	1	0	0	4
Suspect Grade C Selected C Paper	10	2	1	1	0	4

the observations of the proctors was only thirty, or ten comparisons per suspect. It is of some significance that the total identical errors for each of these three suspects not only exceeded the greatest number in each specific set of comparisons but were greater than any total errors occurring in the thirty pairs. An additional instance will demonstrate the ease with which this modification can be understood and applied. The chairman of another department who was informed that two students had been in communication during an objective examination had this short detection method explained to an assistant. The paper of each student was checked against ten comparable letter-grade papers. It was found that *twenty-three* identical errors occurred in the examination forms of the suspects, while *ten* was the highest number in the twenty

pairs used as a check. If any one paper in these random samples had contained a number of identical mistakes equal to that of the suspected papers the method would have exonerated the students.

The writer does not wish to set any arbitrary limit on the number of papers one should use to establish chance values. We have found ten comparisons, as a rule, to be sufficient but more may be necessary. It must be observed, however, that the necessity for using a more extensive comparison certainly throws doubt upon the validity of the proctors' interpretation of the student's conduct. Under these conditions of doubt we prefer not to accuse a student of dishonesty since to do so might develop problems more serious than the one we were trying to remedy. Incidentally it has been found that the presentation of the data to the student before any accusation is made, providing the instructor is convinced they are conclusive, is the best way to meet the situation. Some of the students who have been interviewed in this way have been kept from violent behavior disturbances, particularly from the impulsion to maintain an initial denial, and have reacted cordially to the instructors.

SIGNIFICANCE OF THE METHOD

The application of the methods briefly described has not only made it possible to quantify dishonesty but has demonstrated to many students that persistent denial of cheating is futile. More positively it has taught some students that cheating during objective examinations is a costly misdemeanor and, in giving emphasis to the prevalence of the practice, has more clearly defined the responsibilities of students and faculty members. Many students do not realize that, as long as grades are assigned on the basis of a normal distribution curve, copying during the examination most frequently deprives honest students of higher grades than they actually receive but unwisely assume they are beguiling the instructor, or, as unwisely, they do not reflect upon their conduct. If faculty members do not educate students to appreciate this fact, if they facilitate cheating by their indifference, or by accepting it as an inevitable institution, or even by denying the existence of the problem, the great majority of students, being honest in examinations, are penalized by unthinking and sometimes unscrupulous classmates. Both students and instructors can profit by a knowledge of this method of uncovering deception, at least the instructors, if they wish their examinations to measure knowledge and not deceit, cannot afford to be indifferent to the prevalence of cheating in their classes.

INDIVIDUAL INSTRUCTION IN VOCATIONAL AGRICULTURE[1]

ROY W. ROBERTS
University of Arkansas

AN experiment conducted by the writer during the school year 1927-28 in seven rural schools in Van Buren County and Faulkner County, Arkansas, indicated that pupils in these schools made more satisfactory progress in vocational agriculture through individualized instruction than by means of group or mass instruction.[2] These schools were typical rural schools, located in the open country and having approximately the same enrollment. Each school offered first year vocational agriculture to pupils in the ninth and tenth grades.

This study was conducted for the purpose of trying out a form of individualized instruction, a method that would permit individual progress in accordance with pupil ability. The need for employing such a method of instruction came as a result of experience and was further manifested by statistical data indicating marked variations in ability and irregularity in attendance of pupils in vocational agriculture. During the past school session, pupils were found in the seven schools referred to above with mental ages ranging from eleven to eighteen years, in the same class. The average class attendance for pupils in these schools varied from sixty to seventy-two out of a possible eighty attendance days during one semester.

The experiment was conducted over a period of four months and involved two groups of pupils, comparable, in-so-far as possible, with reference to size of classes, type of pupils, training and experience of instructors, and amount of reference and laboratory material available. The pupils in these two groups spent ninety minutes each day in class work in vocational agriculture.

Thirty-five pupils enrolled in first year vocational agriculture in four schools comprised the test group. These pupils pursued a plan for individualized instruction in vocational agriculture. This plan consisted of an individual study of farm jobs from job sheets prepared to serve as guides to study exercises, practice exercises, and testing exercises. No effort was made to include subject matter in these job sheets other than

[1] Research paper No. 118, Journal Series, University of Arkansas.

[2] This study is a part of a research project carried on under the direction of the College of Education, University of Arkansas.

that which was stressed in laboratory or demonstration exercises. Page references to standard publications were given and adequate directions indicated on each job sheet. These pupils were permitted to progress as rapidly as they could. When the study of one farm job was satisfactorily completed, as evidenced by the plan for testing, the pupil was permitted to advance to the next job. These pupils, however, as conditions demanded, spent some time each day in group discussions.

The second group of pupils, the control group, consisted of thirty-four individuals enrolled in three different schools. These pupils pursued the same course of study in the same seasonal sequence and in-so-far as was experimentally possible, were presented with the same subject matter. They were not permitted to progress individually but were required to proceed as a group. They were not given job sheets or guides, but were assigned the same farm jobs or units of instruction and were given the same reference material as the test group. The control group was required to study and recite in accordance with the established methods of group instruction.

The Terman Group Test of Mental Ability revealed that at the beginning of the experiment the control group was slightly superior in intelligence. The median score for each group was approximately the same, or 100. However, the seventy-fifth percentile of the test group was 121 and for the control group it was 131. The twenty-fifth percentile for the control group was 81 and for the test group it was 69.

The Thorndike-McCall Reading Scale revealed a comparable superiority for the control group. There was little variation in the median score, 56 for the test group and 59 for the control group. However, as in the preceding test, the upper and lower quartile scores indicated marked variations. The median for the upper fifty percent of the test group was 65 and for the control group it was 71. The median scores for the lower fifty percent were 50 and 56 respectively.

The Farm Crops Information Test given at the beginning of the experiment indicated that the control group possessed a larger store of agricultural information pertaining to farm crops than did the test group. This test is one of the National Agricultural Tests prepared under the direction of the Department of Rural Education of the Pennsylvania State College.

At the close of the experiment an objective test in vocational agriculture was given the pupils in each group. This test was designed by the author and the teachers of the experimental schools. It consisted

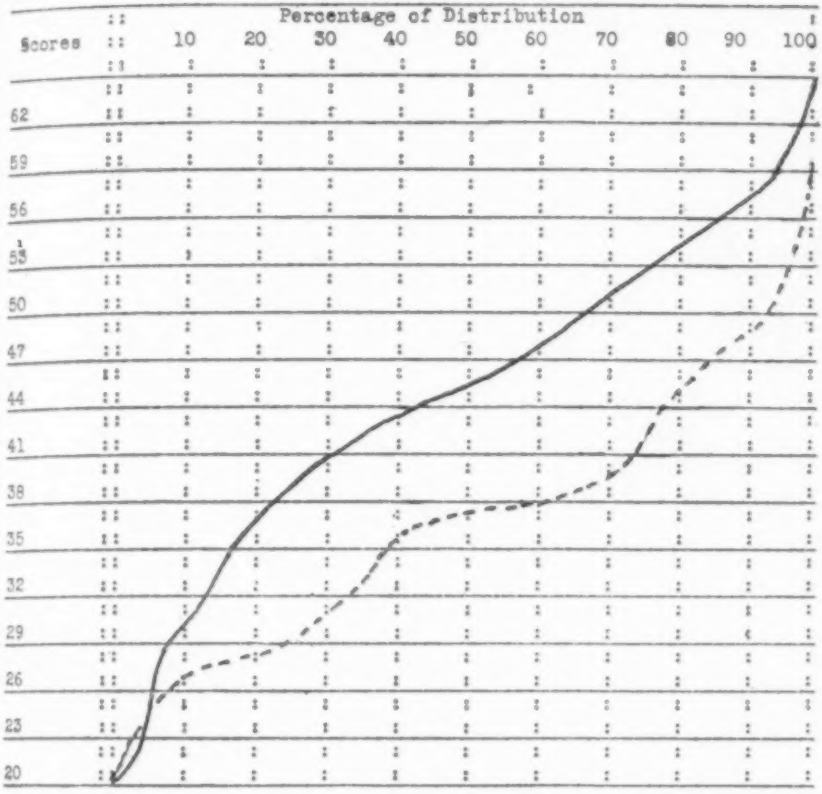

FIGURE I. PERCENTILE GRAPH SHOWING A COMPARISON OF THE SCORES MADE BY THE TEST GROUP WITH THOSE MADE BY THE CONTROL GROUP ON THE VOCATIONAL AGRICULTURAL TEST. The heavy line indicates the distribution for the Test Group. The broken line indicates the distribution for the Control Group. (This figure should be read as follows: 10% of pupils in the Test Group made scores below 32; 10% of pupils in the Control Group made scores below 28, etc.)

of seventy true-false, selective answer, and completion questions, covering the subject matter included in the semester's work in vocational agriculture. These tests were administered and scored under the direction of the author.

The median score for the pupils of the test group is approximately 45. The median score for the pupils in the control group is approximately 37.

The seventy-fifth percentile for the test group is approximately 53, and 41 for the control group. The twenty-fifth percentile for the pupils of the test group is approximately 39, and for the control group it is approximately 29. The twenty-fifth percentile for the test group exceeds the median for the control group, and the seventy-fifth percentile for the control group falls below the median for the test group as a whole.

The distribution of the scores of the test group is almost a perfect normal distribution. The distribution of the scores of the control group is more irregular but very closely approaches a normal distribution curve.

SUMMARY

1. These data indicate that the test group has proved markedly superior to the control group in the acquisition of information included in the course of study for the first semester of the course in first-year vocational agriculture for Van Buren and Faulkner Counties, Arkansas.

2. These data indicate that although the pupils in the control group proved to be superior as a group, they did not acquire agricultural information as thoroughly and as readily as those pupils in the test group.

3. The results of this controlled experiment, with individualized instruction as the experimental factor, provide a reasonably valid justification for the contention that the superior progress of the test group in the acquisition of vocational agriculture content material was due to the individualized method of instruction.

EDITORIALS

RESEARCH IN EDUCATION

Concerned with means to ends
or
with relations due to the nature of the process

There are abroad two radically different concepts of the functions of research in education. According to one notion it is the purpose of research in education to *evaluate* educational materials and processes. Thus research is a kind of measuring tool or instrument of appraisal. To think so of research one must have previously settled upon some more remote values or standards of value in education. These more remote values may be quite near such as ability to read or write or calculate, or they may be quite remote such as power to realize the true, the beautiful, the good, or what not. According to this concept of research it is its purpose to evaluate the plans, procedures, and content of education in the light of their efficacy in attaining goals; for example, the project method *vs.* the contract method of teaching, extensive *vs.* intensive reading, distributed practice *vs.* concentrated practice, etc.

A second notion of the purposes of research is that it is the function of research to discover *relations* between the pupils and the materials and processes of learning and teaching. An experimentalist of this sort is interested in explaining things and their inter-relationships. He is interested in finding out what is. He is not particularly concerned about whether the conditions and relations discovered are good, bad, or indifferent, but only with what they are because of the nature of mental and of personal action. He seeks to know how human beings behave and how they will react in various previously determined situations and under previously determined conditions. He is interested, for example, in the relation between personality traits and teaching success; the relation of practice to rates of learning to add; the physical conditions of learning (light, heat, seating, freedom from disturbance, etc.); and the limiting or possible number of strokes per given unit of time in typing. The ability to add may or may not be valuable; he is not concerned with this; he is merely interested in relations.

Not every reader is aware of these two wholly different concepts of research. The commonest notion of the function of educational research seems to be the first—that it is its function to evaluate. This view is, however, not one entertained at all by physical scientists, since they are concerned with relations fixed in nature. If the products of research are to be properly applied to school problems it is important that readers distinguish between these two concepts of research. Two researches, one performed by an experimentalist interested in values and one by an

experimentalist interested in relations but both made of the same problem and with equal scientific rigor, may look very much alike superficially but be quite different in reality. They are colored by different philosophies of science. The over credulous reader who is looking for evaluations, and thinks of science as the ultimate authority on all matters of educational concern, and who does not distinguish between these view points of science or who applies his own philosophy of science, expressed or assumed, may do untold harm in the application of the results of science to school problems. He may through his own subjective interpretations and personal applications of the results of science become a real hinderance to the scientific study of education. By unconsciously applying his own standards of value the science of education may become the authoritative justification of what is.

Closely related to this problem of the functions of research is that of measurements in research which include only a part of the relations involved in the problem. A very good illustration of this restricted application of scientific methods to education is seen in recent studies of the motivation of school work. There are two methods of motivating school work: (a) by the use of indirect incentives in which one uses drives extraneous to the subject itself, such as competitions and systems of rewards and punishments, that is, something outside of the activity for productive results; and (b) by the use of direct incentives in which the individual is driven by something intrinsic in the activity itself. The experimental results are not all in agreement about the relative value of these two methods but I wish to speak here of those experiments which show that extraneous incentives are superior to intrinsic incentives. They are superior for the tests used and for the conditions under which the experiment was performed. Extraneous incentives may, however, be far superior for the immediate and direct products of learning such as those measured by the average test, and yet be vastly inferior when it comes to the associate and concomitant learning-habits, attitudes, and ideals. The reader may be quite aware of this fact and say that he is not interested in concomitant learnings and proceed accordingly. But the point is that he should know what he is doing. In speaking of the conditions for which these results hold it should be noted also that one condition for the success of indirect incentives in learning is the presence of a teacher. But teachers cannot follow pupils around all of their lives. Probably a little beginning, gained in school through direct interest in the thing itself, may lead the pupil ultimately much farther than things learned as the result of extraneous drives. Who knows? The only point here is that the reader should be alert to these problems.

It has not been our purpose in this discussion to express preferences about the functions of research or methods of motivation but to state a situation. While this is not a new problem it seemed important enough to be stated again. Not all readers are aware of it or of its importance. When these philosophies of science are not considered the result is likely to be a distorted if not an erroneous view about things.

A. S. Barr.

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

Efficiency Committee, of The Central Division of Illinois State Teachers Ass'n, *Stenographic Reports of Elementary School Lessons.* Bloomington, Ill., Public School Publishing Co., 1928. 96 pp.

For a good many years students of law and of medicine have used the case method of study in their fields. Periodically attempts have been made to apply the method to education; but to date very few of the attempts have been published. It is extremely difficult to put the work of the classroom into a report that will in any way adequately show the whole procedure of the school situation. The nearest approach that can be made to such a situation is through stenographic reports of actual classroom work, which have been annotated to show the action that has accompanied the class work. Such reports are extremely difficult to obtain. First, because the teacher and the pupils are not normal when a stenographer is taking a report of the work. Second, because there are very few stenographers who are sufficiently trained in educational procedure to take such a report accurately. Third, because either two stenographers or one stenographer and another person who are well acquainted with the school procedure and can take notes rapidly, are needed at each report period in order to get both the report of speech and the report of action and then there will be difficulty in coördinating the two.

This bulletin contains the reports of eighteen lessons from the elementary school. The stenographic work is excellent. The material is well chosen. The eighteen lessons are examples of reading, geography, nature, language and arithmetic so that the major fields of the elementary school are covered. With each lesson there is a statement of the teachers' purpose, the assignment that preceded the lesson, the actual lesson reported stenographically, and a brief appraisal of the lesson.

Unquestionably this is a fine contribution to the very limited supply of case material available in education. One would have liked more annotations as to action and the appraisals are almost too brief to be particularly valuable. The lessons are good examples of current practice and as such are specimens worthy of study by teachers in service and by prospective teachers in college or normal classes in methods.

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Potsdam State Normal School

Kelley, Truman L. *Crossroads in the Mind of Man.* Stanford University Press, 1928. vii + 238 pp.

Spearman and his students for twenty years have been devising and perfecting methods of proof based upon objective evidence which may replace subjective judgment and *a priori* "job analysis" or mere guesses or hunches, in the field of mental life. Kelley is showing promise

of becoming one of the most brilliant and productive of Spearman's many brilliant students.

Spearman (Abilities of Man, 1927) gave a superior proof of the existence of G (intelligence, or a general factor affecting all mental life). He separated out and proved the existence of other factors, inertia, oscillation, W (self control or common sense), and a variety of special abilities. Spearman's main reliance in establishing the existence of independent mental factors or abilities, is the tetrad difference formula. This formula uses data from a table of correlations, and is true generally in the field of force, mechanics, or physics, as well as mental life. Spearman regarded this formula as the last word in proving the existence of independent factors, or abilities, or forces operating coöperatively to a common purpose.

Kelley, accepting Spearman's contributions as extremely valuable but as a mere beginning, sweeps forward in masterful fashion, developing sixteen new propositions (in Ch. 3) and showing that this story of determining unit factors or abilities of the mind has only begun. He gives us the converse of the Spearman tetrad difference theorem, viz., "*If a tetrad difference does not equal 0, two or more general factors plus specific factors are necessary to account for the intercorrelations between the four variables.*"

He shows the limitations of the tetrad theorem. He develops the more powerful pentad criterion which permits the handling of five variables. In short, Kelley develops the more discriminating techniques which permit him to break up Spearman's G or general factor, and add to the list of independent factors.

Kelley acknowledges his obligations to Spearman and notes the essential unity of their contributions. "The reader must not conclude," says Kelley, p. 22, "because of the criticisms that have been made of Spearman's technique and interpretation that there is wide disagreement between his findings and those of the present writer. On the whole the two sets of findings are quite remarkably in harmony, the agreements being in the matter of a spatial, a numerical, a memory, and even a general factor, though this last is differently interpreted, and also in the conclusion that a large number of specific motor (probably also sensory) factors exist. There is scarcely a disagreement in the matters of music, purpose, cleverness, and sex, though here the data are inadequate. There does seem to be a real disagreement in the importance and extent of a verbal factor and in that of a mental speed factor."

Kelley's work shows a decided improvement over Spearman's in the selection of the experimental groups. It is well-known that correlations vary directly with the heterogenity of the group being tested. Kelley has endeavored to reduce or eliminate this spurious correlation by confining any one study to a single grade population of white pupils. The new studies reported are based upon populations from grades seven, three, and kindergarten, respectively.

Some of the author's assumptions are undoubtedly open to question. It is assumed that the tests used adequately measure what they are supposed to measure, and that the factor of ability named is adequately separated and defined. In other words, the details involving the application of the mathematical theories of mental factors should be noted as preliminary and tentative, and various remarks in the author's conclusions indicate that he had come so to regard them. In fact, this criticism is common in the final details of the study and plans are

definitely laid for future studies that shall be based upon a more careful selection of the test groups and further improvement of the test items.

This study not only connects directly with the previous monumental work of Spearman but also with the author's own study on Idiosyncracy previously reported (Interpretations, 1927). The author's evident ability in devising necessary techniques and a wisdom in applying them to actual problems involving many human equations, indicates the desirability of utilizing this special ability and wisdom entirely in the field of mental research. The author's attempt to evaluate test items for school use (Interpretations, Chapters 9 and 10) emphasizes the impossibility of one individual covering the whole range of human knowledge. Details of school room procedure, social judgment as to the value of test items, together with many other problems involved in curriculum, methods, and management of children, have obviously been neglected in these said chapters 9 and 10, and apparently emphasize the fact that brilliancy in general cannot function in any field without a full knowledge of and experience with the details of that field.

The final chapter in "Crossroads" deals with future outcomes and not only makes a strong appeal to the imagination, but gives a vista as to the possibilities in the particular line of research of which the author is so able an exponent. The implications in the field of education, child welfare and guidance are of unusual significance. If unit abilities are a fact, a proper regard for social economy should lead the schools, including the universities, to modify their programs in order to conserve whatever unusual human ability may appear in whatever form it may appear.

No university teacher of psychology or education, no research worker in the mental field should fail to read "Crossroads in the Mind of Man." The spirit and method of this work is needed not only among university professors and research workers, but among teachers, school administrators, social workers, and intellectualists generally. It should help in building up the attitude of mind which demands evidence and demonstration as a basis of action. It should help to eliminate *a priori* argument and sophistry, from the field of education. It is an American product of which we should be proud.

G. M. WILSON

Boston University

PYLE, WILLIAM HENRY. *The Psychology of Learning.* Baltimore, Warwick and York, Inc., 1928. ix + 441 pp.

To those familiar with the earlier edition of this book it may be somewhat of a disappointment to find that the revision consists chiefly of the addition of summary statements of principles with examples of their application and additional titles in the bibliographies rather than changes in the body of the text so as to include discussions of significant studies made since the date of the first edition. The organization and chapter titles remain the same with the exception of the addition of two short chapters, one on the "Psychology of Special Subjects" and the other on "A Theory of Learning."

A few new passages, each a paragraph or two in length, have been inserted at various places through the text. For example, a paragraph has been added discussing "recent attempts to work out a universal formula for the learning curve." (p. 28.) Reference has been made at another place to recent studies

on the value of incentives in learning. (p. 64.) A couple of new paragraphs are devoted to recent criticism of the use of the term instinct. (p. 362.) These and a few similar additions in other places constitute the only changes in the text as it was formerly written. There are numerous changes in the paragraphing where no change in thought or wording occurs.

Some omissions occur which stand out rather boldly. For example, no reference is made to the work of Pavlov, Watson and others who have added greatly to our knowledge of how responses become conditioned. Watson's name is not included in any of the bibliographies.

In discussing the transfer of training not enough emphasis is placed on studies of transfer which have been made with school subjects under school conditions. In summarizing this chapter the statement is made that "we have now reviewed the results of the most important studies. We have not discussed several of the minor studies, but reference to all is made in the bibliography at the end of the chapter." Yet, Thorndike's two recent investigations in mental discipline in high-school subjects are not reviewed nor mentioned in the body of the text. They are listed in the bibliography.

There are several changes and additions, however, which greatly improve the book as a text. At the end of each chapter each principle of learning discussed in the chapter has been restated in bold face type and its application illustrated with from one to a dozen practical examples. Altogether one hundred fifteen of these principles are stated and illustrated. These provide a source of practical materials for use and suggestion to teachers and students.

The drawings have been made anew with heavier lines and more distinct lettering. The tabular materials have been set up in a much improved form. The size of the page has been slightly increased and the size of the type slightly decreased.

At the end of nearly every chapter is a bibliography brought up-to-date. All of the titles have been brought together in a single bibliography arranged alphabetically by authors' names at the back of the book. There are more than five hundred titles, about one hundred seventy of which are to studies and books published since the date of the first edition of this book, 1921. These additions and changes have necessitated a thirty-five or forty percent increase in the volume of the book.

C. O. MATHEWS
Ohio Wesleyan University

BENSON, C. BEVERLEY. *Book V and Book VI, Arithmetic Practice for Finding and Correcting Weaknesses in the Step Difficulty of the Processes.* New York, The Macmillan Company, 1929. Book V, 129 pp. Book VI, 128 pp.

One of the most important aspects of the testing movement is the current emphasis on diagnostic testing and remedial instruction. Without question it is desirable to measure general mental ability, special capacities and aptitudes, and educational attainment. However, the results of such measurements merely indicate the presence or absence of certain abilities or attainments. Specific difficulties must be identified through the use of analytical diagnostic tests, and shortcomings eliminated through appropriate remedial instruction and exercises. Substantial remedial work at the elementary, secondary, and higher levels has been attempted within the past few years in such subjects as reading, spelling, arithmetic, and language activities.

In Book V, Benson states a list of possible difficulties in dealing with addition, subtraction, short multiplication, short division, mixed fundamentals, long multiplication, long division, introduction to fractions, addition of fractions, subtraction of fractions, multiplication of fractions, division of fractions, decimal meanings, addition and subtraction of decimals, multiplication and division of decimals, percent, interest, discounts, commission and stocks and bonds, profit and loss, insurance, taxation, denominate numbers, mensuration, lumber, gas and electric meters, graphs, and the metric system. Eighty-eight lessons for discovering weaknesses, or diagnostic tests, and a corresponding group of practice lessons are provided. The author suggests that more than one mistake on a single diagnostic lesson indicates need for practice on the step difficulty involved. Book VI includes a list of ninety step difficulties which cover much the same topics as those listed for Book V, with the exception of emphasis on decimals, foreign money, square root, and business practice.

The first question concerning the difficulties listed, which impressed itself upon the reviewer's attention was with respect to the author's basis of selection. The critical student and thoughtful teacher will be justified in demanding factual or experimental evidence for the inclusion or omission of given lists of difficulties, for the validity of the diagnostic tests in locating weaknesses, and for the effectiveness of the practice materials in eliminating shortcomings. If such evidence has been published elsewhere by either the author or other workers the reader should be referred to it. If no such investigations have been made the inference is obvious, namely, that the author has drawn on his own thinking or other subjective factors.

Certainly the type of activity represented by the books under consideration should be encouraged. These workbooks represent one phase of the current emphasis on individualization of instruction. The advantages in terms of pupil activity and establishment of pupil and teacher consciousness of specific difficulties are apparent.

CARTER V. GOOD
Miami University

CHEN, HSUAN SHAN. *The Comparative Coachability of Certain Types of Intelligence Tests.* New York City, Teachers College, Columbia University, 1928. ix + 101 pp.

This study is an attempt "to compare certain types of intelligence tests as to their relative degree of coachability or susceptibility to practice and training." The justification for the investigation is found in the extensive and uncritical use which is being made of group intelligence tests in the classification and promotion of students, interpretation of achievement, college entrance, and the like. All too often the test scores are regarded as final when they should be interpreted in the light of the test, acquaintance with types of test material, and direct and indirect coaching.

The experiment consisted in giving initial and final tests to about 300 fifth- and sixth-grade pupils and in the "application of coaching between the tests." The subjects were divided into a coached or experimental and an uncoached group. The tests used were (a) the Rapid Survey Test, Forms A and B, and (b) the CAVD Test, levels GHIJ. The materials of the first test consist of the following types: opposites, analogies, number sequence, and classification; those of the second test comprise completion, arithmetic problems, vocabulary, and direction.

The experimental group was coached eight days after the initial test and six days before the final tests were given. Nothing was done to the uncoached group. The coaching consisted in going over the materials of both initial tests "item by item, first reading the question, then telling the right answer to it and also the reason for the right answer, while the pupils followed." The coaching was given at different periods and occupied from three to four hours.

Of the opposites, analogies, number sequence, and classification material, analogies was found to be the most coachable for the coached group and number sequence the most coachable for the uncoached group. Arithmetic problem material was found to be far less coachable than completion, vocabulary, or direction material for both the coached and uncoached groups. No reliable difference in coachability was found among the other tests. Improvability was found to be a "highly specialized function." No conclusions could be drawn as to the effect of practice on variability.

The author's bibliography and review of previous studies constitute a significant aspect of the investigation. The appendixes are valuable in that they show the nature and extent of the coaching that was done. The study should prove stimulating and helpful to both makers and users of intelligence tests.

W. S. GUILER

Miami University

GESELL, ARNOLD. *Infancy and Human Growth.* New York, Macmillan, 1928. 418 pp.

This book, dealing with the characteristics of mental growth in the first two years of human infancy, was written primarily from the point of view of the clinician; the treatment of the subject reflects somewhat more the author's medical training than his psychological training. Indeed he states that the developmental supervision of infancy needs the technique and mores of medicine rather than of education.

Apparatus and devices designed in the Yale clinic for the study of infants are described. These include an alcove with special screening allowing one-way vision only, an observation compartment, a clinical crib and an elaborate photographic dome. By means of this dome it is possible to take simultaneously still and motion pictures of the same subject at any angle desired. The advantage of such a device in obtaining photographs is clear; to what uses such photographs may be put, once they are obtained, is not so clear. The observation alcove should furnish an excellent means for watching a child without his knowledge, when this seems desirable.

Normative items for each month up to ten months and for every two to six months thereafter up to thirty months are given. A method of plotting mental growth curves by logarithmic values is discussed. A large number of case studies are presented, showing the relationship between mental growth and such conditions as irregular growth, glandular and nutritional disturbances, twinning and premature birth. The significance of infancy is also discussed.

To the reviewer the book seems paradoxical in its rigorous use of apparatus and control of external circumstances surrounding the child and its reluctance to reduce the actual data obtained on the child's behavior to any sort of exact quantitative statement. One looks in vain for a statement of how many children at each age were examined for each of the normative items, what the spread of capacities was at any one age, what

the criteria were for examination or non-examination on any item, what sorts of children were examined, or for other proof by which the reader may check or verify the author's conclusions. The method of arriving at the "final" developmental index is particularly obscure. The reader is warned that "serious use of the schedule, in its present form, presumes a large amount of clinical familiarity with infants of every age."

The book is based on first-hand contact and experience with a large number of infants examined several times. The author has kept close to facts as he has observed them, has inquired into the significance of such facts, and has carefully and modestly made his interpretations.

BETH WELLMAN
State University of Iowa

WOODRING, M. N., OAKES, M. E., AND BROWN, H. E. *Enriched Teaching of Science in the High School.* New York City, Teachers College, Columbia University, 1928. xi + 374 pp.

This is not a treatise on enrichment of science teaching but, as stated on the title page, a source book for teachers of general science, biology, physics, chemistry, and other sciences, listing chiefly free and low cost illustrative and supplementary materials. It is one of a series of books being prepared and published by Teachers College, Columbia University, each providing source materials for enrichment of one of the high-school subjects.

Chapter I is headed "Models, Samples, and Exhibits." Under this title materials available for each of the sciences are listed with their sources. The materials for each science are further subdivided for the convenience of the teacher —physics, for example, being divided into heat, electricity, light, and miscellaneous materials. Each listed article is accompanied by the name and address of the company or institution providing it and, in most cases, an annotation giving the reader some idea of the educational value of the article. It is also stated whether the material is free, for loan, or for sale. If listed for sale, the price is given.

Chapter II is headed "Pictures, Posters, Charts." It gives suggestions on the making of bulletin boards and lists sources from which pictures, posters and charts may be obtained. Chapter III gives an extended list of lantern slides for each of the sciences. Chapter IV is a well-selected list of motion picture films. In the case of the lantern slides and films the authors have given rather complete information as to their educational value. Other chapters refer the reader to the proper sources for equipment and supplies, helps for planning plays, materials for use in clubs and projects, materials for career-planning courses, periodicals, pamphlets, bibliographies, available tests for each high-school science, and professional associations for science teachers.

The reviewer feels that the authors have brought together a fund of valuable information not found in any other single volume. Every science teacher who is desirous of relating scientific principles to life situations will find material help in this book. It will be especially helpful to those teachers who are trying to teach science effectively in schools not properly equipped.

A. W. STEWART
Kent State Normal College, Kent, Ohio

AVERILL, LAWRENCE A. *The Hygiene of Instruction.* New York, Houghton Mifflin Co., 1928. xiv + 386 pp.

The author's treatment of problem children seems to be the most construc-

tive part of the book. The chapters on "Home Sources of Conflict" and "The Child-Guidance Clinic" should be of interest to parent-teacher discussion groups. For teachers and prospective teachers—and possibly even parents—the treatment of the hygiene of classification for gifted and deficient children, and that of habit and the conditioned reflex should be an interesting introduction. The material on the hygiene of attitude, the hygiene of performance, the mental hygiene of the school day, and that on the physical basis of mental health is of a more-or-less customary sort with the exception of the emphasis on the importance of the child's developing desirable mental sets and the need of recognizing and providing for student fatigue.

An attempt is made—and much of the material is of no little value—to set forth the "realizable hygienic values or aims" of the various elementary-school subjects, and to give certain "hygienic suggestions" for teaching them. The suggested need of more oral reading, and the transfer implied as possible in the study of some of the school subjects such as composition and art might well be questioned—or at least relegated to the realm of opinion.

Chapters are also included covering the topics "The Mental Hygiene of Study and Study Methods" and "Mental Hygiene, the New Education, and the New Teacher." The non-technical vocabulary in which the book is written, the inclusion of definite problem-child cases, and the occasional use of experimental results all operate to make the book a fairly acceptable one for those who are actively engaged in teaching as well as those prospective teachers and parents who may have had a smattering of psychology.

T. ERNEST NEWLAND
Ohio State University

HAGGERTY, MELVIN E., AND SMITH, DORA V. *Reading and Literature*, Book Three. New York, World Book Co., 1928. ix + 629 pp.

Those who are acquainted with Books One and Two of the above named series for Junior High Schools will heartily welcome this, the concluding volume of the set. For the benefit of any who have not seen the books we explain that Dr. Haggerty and Miss Smith have gotten together, after the most painstaking research and experimentation, a really fine collection of literary masterpieces of all kinds to be used in the seventh, eighth and ninth grades. The texts represent years of tireless research and study of the needs and interests of adolescent children in the field of reading and literature. The material was also submitted to experts in the teaching of English and an evaluation was obtained from them of the selections on the basis of their literary merit and their appeal to the interests of adolescent children.

Book Three, the subject of this review, keeps up the high standard of the other two volumes. The authors cannot be too highly commended for their choice of readings. The range of interest is so wide and the force of the material so compelling that even the indifferent child will find things which attract him, and all who come in contact with the book will find inspiration for further delving into the realms of literature, and a most excellent guide to the same is at hand in the book lists found in each section of the volume. The general headings of Book Three are as follows: (a) The Story Teller's Art, containing short stories, narrative poems, and plays; (b) The Singing Heart, a collection of poems expressive of many moods; (c) What Do You Think, selections of the essay type; (d) Giants in the Earth,

biographies; (e) The Romance of Science and Industry, articles on modern achievements; and (f) Nonsense and Some Sense, humorous poems and stories.

In any collection of this kind the adult reader will look in vain for certain favorites of his own, and will find here and there a selection for which he does not care. This situation is of course inevitable and the only suggestion the writer feels urged to offer is that the amount of informational, biographical and scientific material somewhat overbalances the stories and poems, in the light of his own pleasurable reactions while reading the book. However, this may be explained by referring to the first word in the title of the book, since informational material is generally used in developing effective and economic habits and skills in reading.

The study helps given are many and varied. There are book lists, which have been mentioned before; also explanatory notes, general questions, references to authors, vocabulary and dictionary studies, an article on how to use the library, etc. Dr. Haggerty says in his introduction that these are not supposed to take the place of a good teacher. Certainly they will do such a teacher no harm, and they will surely be helpful and suggestive to the inexperienced teacher and a means of self-examination for the student. They are never so obvious as to mar one's pleasure in reading the book.

Last but not least, the physical make-up of the book is very attractive. In both appearance and contents it will grace the library of any one possessing it long after his school room use of it is over.

GEORGE H. HILLIARD
Western State (Mich.) Teachers College

DRUM, WARREN NEVIN. *A Preview of Teaching.* Boston, Ginn and Company, 1928. vii + 338 pp.

This book is described in the preface as "intended to serve as the basic text for a laboratory course introductory to teaching." Further, it is claimed that it "serves equally well as a textbook for An Introduction to Teaching, or a course in the Technique of Teaching."

In the opinion of the reviewer the author fails to realize these ambitious objectives because the number of pages at his disposal are too few to permit the realization of more than one of them. For example, his treatment of the technique of teaching is condensed into five chapters which discuss discipline, teaching pupils how to study, using the class conference to stimulate reflection, the conduct of drill, and the lesson in appreciation.

Although the author has used a simple style, he has touched upon so many points, especially in his first few chapters, that the elementary student is likely to be confused. Too little assimilative material is provided, and unless "A Preview of Teaching" is supplemented by much reading or class discussion, many of the ideas presented are likely to be meaningless word forms for the average student teacher. Too many books produce this result.

The author's use of the term, project, is rather unusual. For example, in his chapter on "Curricula and Courses of Study," his "observation IX" sets up the "Project: To observe the educative effect of kindergarten activities. Visit any well-equipped kindergarten. *Time:* forty minutes." In other words, "project" is used with the same implications that "lesson aim" carried in normal school practice two decades ago.

The limitations of this book seem so obvious to the reviewer that he feels that its use probably will be restricted to that of a supplementary text on the library shelves. There are a few sections that are very fine, but, as a whole, it does not measure up to a very high standard.

CHARLES ELMER HOLLEY

AYER, F. C., AND BARR, A. S. *The Organization of Supervision*, (An Analysis of the Organization and Administration of Supervision in City School Systems). D. Appleton and Company, 1928). 397 pp.

Modern civilization, complexity, organization, change, reorganization to facilitate change, further reorganization without end, so runs the story if a high level of efficiency in any social institution is to be maintained. The present organization in supervision has been haphazard, accidental, established to meet an emergency, to make the best of what one had, without much forethought or study. The superintendent has had to act in the light of the best knowledge available, and that was little and scattered, the problem was too new. Reorganization is of the same type. Guidance is needed.

The authors of this book have done yeoman service in collecting data concerning current practice and the findings of research upon major problems within the topic. Its practical nature is at once apparent from the chapter headings among which we find "The Present Status of the Organization of Supervision," "The Distribution of Supervisory Duties," "The Place of the Special Supervisor," "The Interrelation of Supervisory Officials," "Schematic Types of Supervisory Organization," "Typical Supervisory Organizations in Large Cities," "In Small School Systems," and finally the "Principles of Efficiency in the Organization of Supervision."

The book is a veritable mine of information, since it was the authors' purpose to show what is being done in the public schools of the country, and since this practice is so variable, the task of collecting and presenting it was no small problem. By means of charts, tables and diagrams they have condensed this into usable form in an admirable way. The conclusions drawn from these findings are practical and forward looking. It should be extremely useful to the administrator looking for light.

It seems weakest, however, just where strength is needed. Because of the confusion and lack of efficiency in practice, because school men are looking for help and guidance, some basic principles of evaluation are needed. True we find principles of efficiency in organization in the final chapter but these principles themselves are not drawn from any clearly stated concept of educational purposes and values. The writers might have taken a leaf from the book by Moehlman from which they quote: "We have turned a corner, one might almost say about face, in our thinking about school organization and administration. Administration and organization have been too much ends in themselves. They are really as much means of securing educational changes as is teaching." To plan our teaching without reference to clearly stated educational values would be the height of folly. It is no less true in the organization of supervision. This idea is so excellently demonstrated by Moehlman that his book should, in a very real sense, set the pattern.

In the editor's introduction we read that there is "a need for an authoritative analytical discussion looking toward a clarification of supervisory relation-

ships, functions, and duties." (P. v.) The only authority given for principles for organizing supervision is that drawn from practice which is extremely variable and largely the product of accident, or the appeal to efficiency in industry and business. If we are to think in terms of functional organization of supervision, we must draw our authority from the nature of the educational product desired. It is a well-known fact that the values education seeks is so at variance with the objectives of industry and business, as these are at present organized, that it is dangerous to reason from one to the other. Under the leadership of the principles of democracy they are getting along with less centralized authority in Germany and Austria. In the elementary school sound educational thinking leads us to an intimately integrated curriculum throughout. This and the results for which the integrated curriculum is introduced are not in keeping with the practice of special supervisors, a practice advocated by the authors.

It is not the intention here to disagree with these positions, but to point out that only as we view these questions of organization in relation to clearly defined educational values may we reach any reliable conclusions. Functional organization and administration are here. The school men of the country must be led to consider their plans for procedure in relation to educational values. This, the book under discussion, does not do to any large extent.

O. G. Brim

Ohio State University

Safir, Shelly R. *Biology Experiment Sheets.* New York, Globe Book Co., 1929.

The purpose of these *Sheets* as explained by the author is to direct the laboratory phase of a course in elementary biology.

The set is made up of 90 sheets, each sheet being devoted to one unit of instruction There are two reference pages of clear, well-chosen diagrams (20 in all) intended to help the pupil in identifying various structures. Sheets 1-2 present a general introduction to the course; 3-11 are intended to furnish a chemical background; 12-57 relate to plants, including most of the essential aspects of plant life; 58-76 relate to animals, nine forms being used as types; 77-90 relate to human biology, with considerable emphasis upon care and protection of the body.

An *Experiment Sheet*, which is really a set of directions to guide the pupil in his study of a particular biological subject, includes six headings in the following order: Problem, Apparatus and Materials, Method, Observation, Conclusion, Application. Under "Problem" is merely a statement of what is to be undertaken; under "Conclusion" questions are presented which are intended to help the pupil interpret what he has observed, or, as in many cases, the interpretation is suggested; under "Application" are a number of questions which are meant to add significance to the problem.

With perhaps one exception the subject matter presented in the various sheets will meet the approval of most biologists. The one exception relates to ventilation. The old demonstration of the candle and box is used. It would be difficult for the pupil to conclude that good ventilation is largely a matter of temperature, humidity, and air currents rather than the chemical purity of the air.

If the teacher of biology is looking for actual experiments and real problems, he may be disappointed. If, on the other hand, he believes that laboratory work in biology should assume the character of

verifications and demonstrations, he will be pleased with these *Experiment Sheets*.

B. M. DAVIS

Miami University

GREENE, HARRY A., AND JORGENSEN, ALBERT N. *The Use and Interpretation of Educational Tests; A Handbook for the Classroom Teacher*. New York, Longmans, Green and Company, 1929. 389 pp.

Not many of the numerous volumes dealing with the testing movement possess really high merit, but the reviewer believes the recent book by Greene and Jorgensen should be so classed. It is intended for those already in service rather than for students, and for elementary-school rather than high-school teachers. For this purpose the reviewer thinks it is not excelled by any other book now available. The general chapters will be helpful to high-school teachers, but since practically all the illustrative material is drawn from the elementary field and since no secondary subjects receive detailed attention, the book can hardly be recommended to high-school teachers.

Following introductory chapters dealing with the development and the meaning of educational tests, are others on the selection and use of tests, teacher-made examinations, necessary statistical methods, the interpretation of scores and the place of tests in diagnosis and remedial teaching. One-third of the book is devoted to this latter topic, with special attention to arithmetic, language, and reading. The book is simply and clearly written and should be easily understandable by teachers who have had no, or almost no, previous contact with testing. It differs from a number of more or less similar volumes in that it does not contain descriptions or critiques of many tests. The reviewer believes that this is a desirable omission, although it renders it more necessary than usual that those who employ the book have available samples of standardized tests. Well-selected lists of references follow the chapters. The appendices contain useful information such as lists of tests and remedial materials, problems involving the application of statistical methods to test data, and a glossary.

The only important adverse criticisms which the reviewer would offer have to do with omissions. He believes that even in a beginning book the history and development of the movement should be treated at somewhat greater length. Furthermore, more attention might well be given to the less important elementary-school subjects. Also the definitions and explanations in the glossary are in a number of cases too brief.

C. W. ODELL

University of Illinois

KOLBE, PARKE R. *Urban Influences on Higher Education in England and the United States*. New York: The Macmillan Company, 1928. viii + 254 pp.

This work is both historical and analytical. It traces the influences on higher education of the development of the modern industrial city and presents an "analysis of present conditions in urban higher education." Part I deals with England and Part II with the United States. There is no summary of the two parts; instead the author has sought to secure unity by numerous cross comparisons. He shows that in each country urban institutions "do actually represent a departure from the traditional which is daily growing more apparent and which is directly conditioned by their surroundings"; and that, notwithstanding the different social conditions under which they have developed and

differences in administrative detail and academic nomenclature, they are fundamentally similar in their aims and programs. Among the more important characteristics of these institutions are the provision of instruction in subjects which are outside of the traditional curriculum, but which are adapted to the needs of the urban community, and the extension of educational facilities to the adult population.

Adult education, the demand for which has been one of the most important influences affecting the development of urban higher education, and the provision of which is such a prominent feature of the work of the urban university gets a large amount of space. This explains the inclusion of this work in the series of studies in adult education published under the auspices of the Carnegie Corporation and the American Association for Adult Education.

Although there is a considerable body of literature dealing with urban influences on higher education, this is, so far as the reviewer knows, the first extended systematic treatment of this very important subject. It will, therefore, prove a very useful book; it would have been even more useful could the corresponding developments in Germany have been included within its scope. President Kolbe has been an active participant in the urban university movement in the United States, and has visited most of the urban institutions in England. He, therefore, has more than a merely academic interest in and knowledge of the phenomena he describes. The work is not exhaustive or technical in treatment, but is evidently designed for the general student of education rather than for the specialist. It is not free from errors of fact. There is no index.

R. H. ECKELBERRY
Ohio State University

MORTON, ROBERT LEE. *Laboratory Exercises in Educational Statistics: With Tables.* New York: Silver, Burdett & Company, 1928. vii + 145 + lii pp.

The past ten or twelve years having seen the field of educational statistics well supplied with texts, authors in the field are apparently now giving more of their attention to the matter of improving methods of teaching the subject. Arithmetic and other branches of mathematics have long been regarded as easy to teach because one could draw his illustrative material "from the air" as the occasion required. But statistics represents a peculiarly practical branch of mathematics, which is nothing if not applied; and since students do not make a wide variety of applications of general principles and new techniques without being well started in this direction by their instructor, it is highly important that the exercise material in this very practical subject be carefully selected so as to develop in the student the habit of attacking his problems quantitatively. This requires that the exercises have a practical cast, representing real problems that actually do arise; that a variety of applications be given, to increase the probability of transfer; that the amount of time required by the student be reasonable, etc. Exercises made up on the spur of the moment cannot be expected to be satisfactory educationally.

To meet this need, a number of exercise books have been prepared. Two such books are primarily adapted to the field of economics; two purport to supply the field of educational measurements, while Morton's *Laboratory Exercises*, and another exercise book now in press, lay claim to the general field of educational statistics. Morton's book is

the newest one available, and is here considered.

The author explains in his preface that the material in the book has gone through several years' use, during which it has grown from a set of direct assignments to its present form which is something of a composite. Each exercise contains (1) a brief explanation of the statistical procedure involved, usually giving the necessary formulas and an illustration; (2) a set of exercises or problems for the student to calculate and solve; (3) a list of questions to stimulate reading and study by the student; and (4) references to a number of text books which treat the topic. There are fifty of these exercises, divided into two parts designed for a two-semester course.

The author has carried out his purpose well. Authenticity in technical detail is not perfect, but is satisfactory. The selection of topics is good. The exercises are well adapted to student use, and the questions are pertinent and suggestive. The references are designed to be comprehensive rather than selective. The discussion is short, but occasionally new material appears, such as in Exercises 39-44, dealing with partial and multiple correlation. The mechanics of the book are good. Only four errors were noted in the first perusal. Occasionally the printer has made poor alignment of rows and columns. (*e.g.* 74)

The exercises comprise 120 pages. There follow about 20 pages of answers, and 50 pages of tables. The answer section contains reproductions of entire frequency tables for a number of correlation problems, affording a check on the tabulation. The tables include logarithms, squares and square roots, and eight other statistical tables.

In symbol usage, the book does not reach the level of texts now on the market, and seems needlessly inconsistent. While the choice of statistical symbols is not a fixed matter for certain ones, we expect those that are adopted to be used consistently for the sake of the student. In this book, **d** may be an actual deviation from the mean (p. 28), a deviation from the median taken without regard to sign (p. 24), or a deviation from an arbitrary origin in terms of class intervals. (p. 50) The symbol **e** is used for the last named meaning of **d**, and is also used to mean deviations taken without sign. (p. 26) The correction, **c**, may be the difference between the mean and the guessed mean (p. 13), or the difference between the median and the midpoint of the median interval. (p. 26) On pages 49 and 50 **xy** and $\mathbf{d_x d_y}$ are used interchangeably without comment. On page 50, the author uses $\mathbf{\Sigma xy}$ in the formula, and substitute values of $\mathbf{\Sigma d_x d_y}$ (but not so labeled) from the illustrative problem just above. Pages 73 and 74 are perhaps a still more flagrant violation of reasonableness in the use of symbols. There is no obvious reason for such carelessness. It adds enormously to the difficulties of the learner.

The book in its present form is a combined syllabus, exercise book, and manual, with a strong leaning towards a text. For example, a rough page count (by nearest quarter pages) gives 66 pages of explanation, discussion and illustration of processes (regular textbook material); 20 pages of presentation of problems, including data; 15 pages of questions. Sixty-six pages of text material for a two-semester course seems to the reviewer to be a difficult amount to use. The treatment cannot be an adequate substitute in itself for a text; and if used in conjunction with a text or in addition to sets of current texts in the library, the material largely loses pur-

pose. Some of this textual material consists of practical suggestions not contained in other texts; other parts of it are so inadequate that they probably will add difficulties to the path of the student. (e.g., p. 13, pp. 73, 74)

The reviewer is lead to question whether this book represents the direction in which we should move, or whether texts, exercises, and tables should be prepared as separate publications. Certainly the latter plan offers more opportunity for flexibility and adequacy. For those who desire a work of this scope, however, the book merits early consideration.

DOUGLAS E. SCATES
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CONOVER, MILTON. *Working Manual of Original Sources in American Government.* Baltimore: The Johns Hopkins Press, 1928. ix + 167 pp.

The market has been fairly flooded recently with books of readings supplementing textbooks in American government. These have been of two types. One type has emphasized documentary materials illustrative of American government; the other type has included short articles and excerpts from other secondary works. Mr. Conover's Working Manual of Original Sources is of neither type. It is not a collection of readings but a collection of problems or exercises. The exercises are adapted to the Congressional set of public documents. The students are to make use of these documents in preparing their assignments.

There is a remarkable degree of uniformity in the organization of the exercises. Each exercise includes fifty different assignments, each intended for a different student. Topics of kindred interest are designated by the same number in various exercises. Assignments numbered 1 to 10 in each exercise are topics primarily of historical interest, while the remaining 40 relate to political problems that recur in corresponding assignments in several of the exercises. Explanations by the author appear at the beginning of each exercise.

The exercises are not well proportioned for use in a course in American government covering the national, state, municipal and local fields. Out of a total of 20 assignments, there is only one on state government, and one on city government, while five are on congress, and five on the executive and administrative branches of the national government. This disproportion is perhaps due to the difficulty of finding suitable material for assignments in all fields.

There are two aims suggested by the author. One is to introduce the student to the general field of original sources. The other is "to cultivate in the student the creative interests and to afford a constructive expression of the productive energies that easily may be suppressed by over-much receptive reading of textbooks and passive attention to lectures." There is no doubt about the merit of these aims nor about the need for more extensive use of material of this kind in connection with textbooks, and for the instructor who does not care to take the time or trouble to work out his own exercises this manual will be very useful.

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RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

ANDERSON, C. J. AND FOWLKES, JOHN GUY. *A Study of Budgeting and Allotment of School Supplies.* Eau Claire, Wisconsin, Eau Claire Book and Stationery Company.

The second of a series of studies dealing with school supplies and equipment carried on by the authors under the grant of funds from the National School and Supply Association.

National Education Association Report of the Committee on School House Planning, Washington, D. C., National Education Association, 1925.

Contains material on the planning and construction of school buildings, determination of the schedule of rooms, choices of general plan, capacity of instruction rooms, capacity of library and study halls, detecting waste in the plans, state regulations, illumination, safety, specifications, estimating the cost of school buildings, planning gymnasiums, etc.

NEALE, M. G. "A School Building Program for Springfield, Missouri." *University of Missouri Bulletin*, No. 27, Columbia, Missouri, University of Missouri, 1928.

The report is organized into five chapters dealing with the present plant; factors to be considered in the planning of a building program, estimating future enrollment, the building program proposed, and means of financing the plan. The report is well documented, containing numerous tables, charts, and maps.

NOLAN, ARETAS W. "Techniques Used in Dealing with Certain Problems of College Teaching." *University of Illinois Bulletin, No. 40*, Urbana, Illinois, Bureau Educational Research, College of Education, University of Illinois, 1929.

This bulletin describes the techniques and comments of a group of college instructors on certain problems of method in classroom instruction. On the basis of personal interviews a questionnaire was drawn up in which the problems of instruction were classified under thirteen major headings. The bulletin reports, in order of frequency, the procedures used by instructors of the University of Illinois in meeting these problems.

ODELL, C. W. "The Use of Scales for Rating Pupils' Answers to Thought Questions." *University of Illinois Bulletin*, No. 36, Urbana, Illinois, University of Illinois, 1929.

In the standardized test movement two kinds of measuring instruments have appeared, namely, tests and scales. The scales have been particularly successful in measuring such products as handwriting, composition, etc. This study is an attempt to build a scale for rating pupils' answers to thought questions. The various steps in constructing the scale are reported. On the basis of the findings,

the author concludes that the average reliability of ratings made with the scale are only slightly higher than ratings made without the scale.

Research Bulletin of the National Education Association, "The Principal and Progressive Movements in Education." Washington, D. C., National Education Association, 1929.

The importance of the principalship in supervision has come to be recognized. This bulletin is an attempt to assist principals in the supervision of instruction. Materials and readings are presented for the following topics: Child health, the mental life of the child, individual differences, character education, pre-school education, and parent education.

VAN WAGENEN, M. J. *Comparative Pupil Achievement in Rural, Town, and City Schools.* (A study conducted for the Department of Education, State of Minnesota), Minneapolis, University of Minnesota Press, University of Minnesota, 1929.

This study reports data on the comparative pupil achievement in rural, town, and city schools in the subjects of reading, American history, geography, arithmetic, spelling, and English composition. The report also furnishes norms of attainment for the elementary schools of Minnesota, and tables by which the achievement for individual schools may be checked. There is also an interesting chapter on the attainment of beginning rural school teachers in elementary-school subjects. The report confirms the findings previously pointed out that nine-months schools and graded schools are more effective than rural schools.

WILSON, M. C. "Extension Methods and Their Relative Effectiveness." *Technical Bulletin*, No. 106, Washington, D. C., United States Department of Agriculture, 1929.

A survey of different methods of carrying on extension work and their relative effectiveness. The effectiveness of different methods was checked in terms of the influence of the method on the spread of farm and home practices. Demonstrations, news stories, office calls, and the direct spread from one neighborhood to another seemed to be more closely associated with total extension accomplishments than the returns from other extension methods. The unit of extension workers' time spent on preparing three stories and interviewing local editors influenced the adoption of three times as many practices as a corresponding unit of time spent on farm and home visits, and fifteen times as many practices as a unit of time devoted to exhibits. A unit of time spent on farm and home visits was three-fourths as effective as a unit of time spent on general meetings and nearly twice as effective as a corresponding amount of time spent on demonstrations. Time spent on circular letters was much more effective than time spent on individual correspondence.

EXPERIMENTAL STUDIES REPORTED IN CURRENT ISSUES OF OTHER MAGAZINES

EDUCATIONAL ADMINISTRATION AND SUPERVISION

ARNOLD, HOMER L. "Marking Systems in Teacher Training Institutions." *California Quarterly of Secondary Edution*, IV, (April, 1929), 244-248.

A study of the marking systems of one hundred teacher-training institutions in thirty-four states. The results are summarized in some twenty statements.

BUCKINGHAM, B. R. "Research in Teacher Supply and Demand." *Edu-*

cational Administration and Supervision, XV, (April, 1929), 259-268.

A discussion of the importance of research in teacher supply and demand with an analysis of some of its aspects.

COURTIS, S. A. "Problems in the Appraisal of Supervision." *Educational Administration and Supervision*, XV, (April, 1929), 269-278.

The author recognizes five types of activities in supervision: Research, teacher direction, teacher assisting, teacher training, and public relations. There are two philosophies of supervision, the philosophy of efficiency and the philosophy of growth. In the appraisal of the results of supervision there are three problems: (1) measurement of the amount of supervision teachers receive, (2) measurement of the changes produced in teachers by the supervision received, (3) measurement of the effects upon the children of the changes in the teacher produced by the supervision.

GAMBRILL, BESSIE LEE. "A Critical Review of Researches in Supervision." *Educational Administration and Supervision*, XV, (April, 1929), 279-289.

Seven thousand six hundred and fifty-three running pages of magazine materials were analyzed for research articles on supervision. About seven percent of the pages analyzed were given to the subject of supervision. There were, all told, fifteen articles on supervision that were classified as research. A similar analysis was made of recent textbooks in supervision. The author indicates where research materials can be found and stresses the importance of objective studies of supervision.

JUDD, CHARLES H. "Examples of Scientific Procedure in Supervision." *California Quarterly of Secondary Education*, IV, (April, 1929), 194-200.

The author points out that the schools are a generation behind medicine in scientific procedures; that scientific evaluation means more than measurements and that studies of present practices are of limited value. More detailed supervision of the specific case-study type is recommended.

PSYCHOLOGY OF LEARNING

ATKINSON, W. R. "The Relation of Intelligence and of Mechanical Speeds to the Various Stages of Learning." *Journal of Experimental Psychology*, XII, (April, 1929), 89-112.

A study of the relations between intelligence and learning ability.

CHANEY, RUTH M. AND LAUER, ALVAH R. "The Influence of Affective Tone on Learning and Retention." *The Journal of Educational Psychology*, XX, (April, 1929), 287-290.

A study of the relation of the law of effect to the mastery of subject matter. From an intensive study of twenty-two cases, the author concludes that factors other than merely affective tone would be highly potent in facilitating learning, and that the effect attributed to learning under pleasant conditions is erroneous.

GOODENOUGH, FLORENCE L. AND BRIAN, CLARA R. "Certain Factors Underlying The Acquisition of Motor Skill by Pre-School Children." *Journal of Experimental Psychology*, XII, (April, 1929), 127-155.

An experimental study of the motor skill of pre-school children. Practically no relation was found between initial status and gain. A small negative correlation, –.349, was found between total score and IQ. The boys exceeded the

girls. An analysis of the individual learning curves indicated a number of factors influencing success: emotional factors, forms of procedure, false association of cause and effect, misunderstanding of verbal directions, incorrect focusing of attention and frequent random changes.

HOLZINGER, KARL J. "The Relative Effect of Nature and Nurture Influences on Twin Differences." *The Journal of Educational Psychology*, XX, (April, 1929), 241-248.

The data employed in this study consists of a portion of the material gathered for an extensive investigation of identical and fraternal twins. Certain formulas are developed and from the application of these the author concludes, (1) that, for intelligence, nature is about equally effective with nurture in producing mean twin differences, but is somewhat more effective than nurture in determining variability in such differences. In the case of scholastic achievement, the relative influences of nature and nurture probably change with the trait. In general, we should say that a fifty-fifty division is suggested.

NEWKIRK, B. H. AND GUNDLACH, R. H. "Transfer of Training in the Cancellation Experiment." *The Journal of Educational Psychology*, XX, (April, 1929), 291-294.

A repetition of Poffenberger's experiment reported in his "Applied Psychology" from which the authors conclude that practice in the cancellation of one item aids in the speed of canceling another.

PERRY, WINONA M. "Are Boys Excelling Girls in Geometric Learning." *The Journal of Educational Psychology*, XX, (April, 1929), 270-279.

The author reaches conclusions somewhat different from those found in earlier studies, concluding that although as a group the boys were somewhat higher in general mental ability and in reasoning ability, the girls reached a higher degree of achievement in the solution of exercises in geometry.

PYLE, W. H. "The Reading Span." *Elementary School Journal*, XXIX, (April, 1929), 597-602.

The term "reading span" is here used to mean the number of words that can be grasped and immediately repeated after a three-second exposure of reading material. The reading span is therefore different from the eye span.

The author found a positive correlation between reading span and scores in speed and comprehension in reading.

PYLE, W. H. AND SNEDDEN, G. H. "An Experimental Study of Bright and Dull Pupils." *The Journal of Educational Psychology*, XX, (April, 1929), 262-279.

An intensive study of the differences between bright and dull pupils. Data are presented for thirty-one bright pupils and twelve dull pupils. Two sets of experiments were performed, one for ideational learning and one for motor learning. The author concludes that if the brightest and most successful high-school pupils are compared with the dullest and least successful pupils, in some types of work including certain forms of learning, some members of the dullest group will excel some members of the brightest group. Some functions will be possessed in high degree and some in low degree by the same person.

WHITLEY, M. T. "Childrens' Interest in Collecting." *The Journal of Edu-*

cational Psychology, XX (April, 1929), 249-261.

Lehman and Witty found that children now-a-days are less interested in making collections than they were thirty years ago. From a detailed investigation the author concludes that in the region for which this study was made, there is a general interest among children in collecting. Interest is strongest at the ages of nine to thirteen.

EXPERIMENTAL STUDIES OF TEACHING

NEWMARK, DAVID. "Students' Opinions of Their Best and Poorest Teacher." *The Elementary School Journal*, XXIX, (April, 1929), 576-585.

Two hundred and twenty-three normal school students were asked to list the characteristics of their best and their poorest teachers. The study presents an analysis of the characteristics of good and poor teachers as found in these data.

SYMONDS, PERCIVAL M. AND LEE, BALDWIN. "Studies in the Learning of English Expression, II." *Teachers College Record*, XXX, (April, 1929), 686-692.

This article is the second of a series of articles dealing with the learning of English expression. The present study is a report of an investigation of the correct use of capital letters.

EDUCATIONAL TESTS AND MEASUREMENTS

HERMANS, MABEL. "The Procedure for the Revision of the Los Angeles Junior High-School Curriculum in English." *California Quarterly of Secondary Education*, IV, (April, 1929), 249-264.

A practical discussion of the steps in the revision of the Los Angeles Junior High-School curriculum in English. The procedure for the selection and placement of subject matter and for appraising the results in practices is given in full.

WILLISTON, ARTHUR L. "The Activity of a Research Scientist in the Government Service." *Educational Record*, X, (April, 1929), 126-131.

An itemized statement of the activities of a research scientist in the United States Bureau of Standards.

CURRICULUM RESEARCH

CONRAD, EDITH N. "Manuscript Writing Standards." *Teachers College Record*, XXX, (April, 1929), 669-680.

Since manuscript writing is now becoming more generally taught in the schools there has arisen a demand for standards in this type of writing to be used by teachers as a basis of judging the work of their classes. This article attempts to furnish such standards.

MATHEWS, C. O. "Erroneous First Impressions on Objective Tests." *The Journal of Educational Psychology*, XX, (April, 1929), 280-286.

From a tabulation of 22,000 multiple choice items and 555 changes, 53 percent raised the score, 21 percent lowered it, and 26 percent had no effect. In 18,000 true-false items, 570 changes were made, 63 percent of which raised the score, 34 percent lowered the score, and 3 percent had no effect upon it.

RUCH, G. M., BAKER, D. C. AND RYCE, EDWARD. "A Comparison of the Scholastic Records of Junior College Transfers and Native Students of the University of California." *California Quarterly of Secondary Education*, IV, (April, 1929), 201-213.

A statistical analysis of the scholarship records of junior college transfers at the University of California.

TINKER, MILES A. "Photographic Measures of Reading Ability." *Journal of Educational Psychology*, XX, (March, 1929), 184-191.

The purpose of this study was (1) to show the relative validity of the various photographic measures of reading performance, and (2) to demonstrate how variation in the kind of material read affects the consistency of these measures. Sixteen university students and ten high-school seniors were used as subjects in this experiment. The author concludes that:

1. Photographic measures of reading performance were investigated to determine: (1) the relative validity of such measures, and (2) to show how variation in kind of material read influences the consistency of these measures.

2. Intercorrelations were determined between perception time, pause frequency, regression frequency, and pause duration in reading easy narrative and in scientific prose. Also correlations between reading performance in various kinds of material were calculated.

3. Perception time is the most valid photographic measure of speed of reading.

4. In reading easy narrative, pause frequency is a very good measure, pause duration a good measure, and regression frequency a fair measure of reading performance.

5. In scientific prose (study attitude) pause frequency is a very good measure, regression frequency a fair measure, and pause duration a very poor measure of reading performance.

6. Only a moderate sized correlation (about .46) exists between performance in reading easy narrative and in reading scientific prose (study attitude). Reading performance in scientific prose yields a good correlation with performance in algebra, a fair correlation with performance in simple formulae and a slight correlation with performance in complex formulae.

7. Changes in the reading situation favor inconsistency in reading performance: the greater the change in reading attitude the less the correlation between reading performance in the different situations.

MISCELLANEOUS STUDIES

JONES, VERNON. "Ideas on Right and Wrong Among Teachers and Children." *Teachers College Record*, XXX (March, 1929), 529-541.

Sixteen situations involving moral choices were described and four solutions or responses were given to each situation. These situations and responses were presented in the form of a test and given to 177 children, 81 of whom were in the seventh grade and 96 of whom were in the eighth grade. The same test was submitted to the teachers. The test is reproduced in full in the authors account of the experiment.

The two most important facts brought out by the investigation are first, the lack of unanimous agreement among both adults and children concerning right and wrong, and second, the wide disagreement in some situations and the close agreement in others between the children's and the adults' judgments.

VANDIVER, MAUDE, AND MELCHER, WILLIAM. "The Effect of Library Reading." *Educational Administration and Supervision*, XV (March, 1929), 190-201.

The report is based upon a study of library certificates issued in the Montrose, Colorado, schools. Data is given on the number of certificates issued, the reading quotients, the intelligence of pupils re-

ceiving certificates, the number of books read, the number of children having library cards, the number of books which children own, the number of books in the home, and the number of children's magazines taken.

Tests Published in 1928*

Agriculture

Indiana Agriculture Test. By Wendall W. Wright. *Kind:* Survey, Diagnostic. *Purpose:* Achievement in agriculture, based on course of study of state. *Grades:* 7 and 8.
Publisher: Bureau of Coöperative Research, Indiana University, Bloomington, Indiana.

Commercial

Elwell-Fowlkes Bookkeeping Test. By F. H. Elwell and John Guy Fowlkes. *Kind:* Survey. *Purpose:* Pupil achievement in first and second semester high-school bookkeeping. *Grades:* 9, 10, 11, 12.
Publisher: World Book Company, Yonkers, New York.

English

Diagnostic Accomplishment Tests in English. By Harold T. Eaton. *Kind:* Diagnostic. *Purpose:* Some fundamentals of spelling, grammar, and punctuation. *Grades:* 7, 8, 9, 10, 11, and 12.
Publisher: The Palmer Co., Boston, Massachusetts.

English Vocabulary Test for High School and College Students, Forms 1 and 2. By W. T. Markham. *Kind:* Survey. *Purpose:* General reading vocabulary of high school and college students. *Grades:* 9, 10, 11, 12, and College.
Publisher: Public School Publishing Co., Bloomington, Illinois.

Précis Test. By Irvin C. Poley. *Kind:* Survey, Diagnostic. *Purpose:* Ability to grasp correctly the central significance of paragraphs. *Grades:* 9, 10, 11, 12, and College.
Publisher: Public School Publishing Co., Bloomington, Illinois.

Pribble-McCrory Diagnostic Test in Practical English Grammar, Test I. By Evaline Pribble, and John R. McCrory. *Kind:* Diagnostic. *Purpose:* Correct English Usage-Sentence Recognition. *Grades:* 7 and 8.
Publisher: Lyons and Carnahan, Chicago, Illinois.

Pribble-McCrory Diagnostic Test in Practical English Grammar, Part II. By Evaline Pribble, and John R. McCrory. *Kind:* Diagnostic. *Purpose:* Correct English Usage-Sentence Recognition. *Grades:* 9, 10, 11, 12, and College.
Publisher: Lyons and Carnahan, Chicago, Illinois.

Wilson-Language Error Test, Test II. By G. N. Wilson. *Kind:* Diagnostic. *Purpose:* Ability to recognize and correct language errors. *Grades:* 3 to College.
Publisher: World Book Company, Yonkers, New York.

Foreign Languages

French

Brown-Brown Silent Reading Test in French. By M. E. Brown and L. P. Brown. *Kind:* Survey. *Purpose:* Reading Accomplishment in French. *Grades:* 9, 10, 11, 12, and College.
Publisher: Research Service Company, Los Angeles, California.

Latin

Indiana Latin Achievement Test. By Wendall W. Wright. *Kind:* Survey, Diagnostic. *Purpose:* Achievement of

*This list of tests was prepared by T. L. Torgerson, Lecturer in Education, University of Wisconsin, Madison, Wisconsin.

17 objectives of Latin given in State course of study for ninth grade. *Grade:* 9.

Publisher: Bureau of Coöperative Research, Indiana University, Bloomington, Indiana.

Latin Grammar Tests, Scales A and B. By Mark E. Hutchinson. *Kind:* Survey. *Purpose:* Measures one of the immediate objectives of Latin instruction in high school; i.e., the functional knowledge of Latin syntax. *Grades:* 8, 9, 10, 11, and 12.

Publisher: Public School Publishing Co., Bloomington, Illinois.

Home Economics

Achievement Scale in Household Science, Division I, Scales A, F, L, R, S. By May E. Davis. *Kind:* Survey. *Purpose:* Achievement in Food Composition and diet, planning, marketing and housewifery, and care preservation, and preparation of food. *Grades:* 8 and 9.

Publisher: Ginn and Company, Boston, Massachusetts.

Clothing Test. By Florence D. Frear, and W. W. Coxe. *Kind:* Survey, Diagnostic. *Purpose:* The knowledge of clothing possessed by high-school girls who are taking or who have completed the course in elementary dressmaking. *Grades:* 9, 10, 11, and 12.

Publisher: Public School Publishing Co., Bloomington, Illinois.

Manual Arts

Detroit Mechanical Aptitudes Examination. By H. J. Baker and A. C. Crockett. *Kind:* Prognostic. *Purpose:* Mechanical aptitudes. *Grades:* 7, 8, 9, 10, 11, 12, and College.

Publisher: Public School Publishing Co., Bloomington, Illinois.

Mechanical Drawing, Forms I and II. By Harry B. Nash and Roy R. Van Duzee. *Kind:* Survey, Diagnostic. *Purpose:* Information and Performance. *Grades:* 7, 8, 9, 10, 11, 12, and College.

Publisher: Bruce Publishing Company, Milwaukee, Wisconsin.

Newkirk-Stoddard Home Mechanics Test. By Louis V. Newkirk and George D. Stoddard. *Purpose:* Ability to organize steps in job-work in Home Mechanics projects.

Publisher: Bureau of Educational Research and Service, Los Angeles.

Woodwork Test, Scale A. By Harry B. Nash and Roy R. Van Duzee. *Kind:* Survey, partially diagnostic. *Purpose:* Technical and related information. *Grades:* 7, 8, 9, 10, 11, 12, and College.

Publisher: Bruce Publishing Company, Milwaukee, Wisconsin.

Woodwork Test, Scale B. By Harry B. Nash and Roy R. Van Duzee. *Kind:* Survey, Diagnostic. *Purpose:* Performance in Shop Work. *Grades:* 7, 8, 9, 10, 11, 12, and College.

Publisher: Bruce Publishing Company, Milwaukee, Wisconsin.

Intelligence

The Crosby-Eaton Hundredweight. By Dr. P. R. Crosby and Harold T. Eaton. *Kind:* Intelligence. *Grades:* 8, 9, 10, 11, and 12.

Publisher: The Palmer Company, Boston, Massachusetts.

Detroit Advanced First Grade Intelligence Test. By A. M. Engel. *Kind:* Intelligence.

Grade: 1.

Publisher: World Book Company, Yonkers, New York.

Kuhlman-Anderson Intelligence Test. By Dr. F. Kuhlman and Dr. Rose G. Anderson. *Kind:* Intelligence. *Grades:* 5, 6, 7, and 8.

Publisher: The Educational Test Bureau, Minneapolis, Minnesota.

Otis Self-Administering Tests, Intermediate Examination, Form C; Higher Examination, Form C. By A. S. Otis. *Kind:* Intelligence. *Grades:* 4-9 (intermediate), 9-College (higher).
Publisher: World Book Company, Yonkers, New York.

Mathematics

Algebra Monthly Survey Test. By Robert R. Goff. *Kind:* Survey. *Purpose:* Knowledge of fundamental processes in elementary Algebra. *Grades:* 9, 10, 11, and 12.
Publisher: The Palmer Company, Boston, Massachusetts.

American Council Solid Geometry Test. By H. W. Raudenbush, L. P. Siceloff and Ben D. Wood. *Kind:* Achievement. *Purpose:* Achievement in Solid Geometry. *Grades:* 11, 12, College.
Publisher: World Book Company, Yonkers, New York.

American Council Trigonometry Test. By H. W. Raudenbush, L. P. Siceloff and Ben D. Wood. *Kind:* Achievement. *Purpose:* Achievement in Trigonometry. *Grades:* 11, 12, College.
Publisher: World Book Company, Yonkers, New York.

An Inventory Test for the Mathematics needed in High School Physics. By L. R. Kilzer and Thomas J. Kirby. *Kind:* Diagnostic, Prognostic. *Purpose:* 1. Points out items useful in high-school Physics, and provides for testing the pupils on these items; 2. Assists in guiding pupils in their choice of high-school physics; 3. Provides an inventory test for use during the first week of the course. *Grades:* 9, 10, 11, and 12.
Publisher: Public School Publishing Co., Bloomington, Illinois.

Brueckner Diagnostic Test in Fractions. By L. J. Brueckner, H. W. Distad and Abbie Chestek. *Kind:* Diagnostic. *Grades:* 5, 6, 7, and 8.
Publisher: Educational Test Bureau, Minneapolis, Minnesota.

Brueckner Diagnostic Test in Whole Numbers. By Dr. L. J. Brueckner. *Kind:* Diagnostic. *Grades:* 3, 4, 5, and 6.
Publisher: Educational Test Bureau, Minneapolis, Minnesota.

Diagnostic Tests in Fundamentals of Arithmetic. By Philip A. Boyer. *Kind:* Diagnostic. *Purpose:* Three arithmetic tests, each representative of grade difficulty as outlined in course of study.
Publisher: Board of Education, Philadelphia, Pennsylvania.

Exercises and Tests in Junior High School Mathematics, Part II. By David Eugene Smith, William D. Reeves and Edward L. Morss. *Kind:* Survey, Diagnostic. *Purpose:* Work in intuitive geometry, introduction to algebra, and arithmetic. *Grade:* 8.
Publisher: Ginn and Company, Boston, Massachusetts.

Exercises and Tests in Plane Geometry. By David Eugene Smith, William D. Reeve and Edward L. Morss. *Kind:* Survey, Diagnostic. *Purpose:* Ability to understand terms, solve originals, and analyze steps in the proof. *Grade:* 10.
Publisher: Ginn and Company, Boston, Massachusetts.

Los Angeles Diagnostic Tests: Signs, Symbols, and Vocabulary of Arithmetic, Forms 1 and 2. By Caroline Armstrong. *Kind:* Diagnostic, Survey. *Purpose:* Number concept and vocabulary of arithmetic. *Grades:* 3, 4, 5, 6, 7, 8, and 9.
Publisher: Research Service Co., Los Angeles, California.

Orleans Algebra Prognosis Test. By J. B. Orleans and J. S. Orleans. *Kind:*

Prognostic. *Purpose:* Ability to learn Algebra. *Grades:* 7, 8, and 9.
Publisher: World Book Company, Yonkers, New York.

Orleans Geometry Prognosis Test. By J. B. Orleans and J. S. Orleans. *Kind:* Prognostic. *Purpose:* Ability to learn Geometry. *Grade:* 10.
Publisher: World Book Company, Yonkers, New York.

Plane Geometry Test, Forms A and B. By Maude McMindes. *Kind:* Survey. *Purpose:* Achievement of geometry students at the completion of their course in plane geometry. *Grades:* 9, 10, 11, and 12.
Publisher: Public School Publishing Co., Bloomington, Illinois.

Schorling-Clark-Potter Arithmetic Test. By R. Schorling, J. R. Clark and M. A. Potter. *Kind:* Survey Diagnostic. *Purpose:* Achievement in six types of arithmetic computation.
Publisher: World Book Company, Yonkers, New York.

Seattle Geometry Test. By M. E. Morgan, W. T. Wait and August Dvorak. *Kind:* Diagnostic. *Purpose:* Nine sub-tests are used semi-monthly as aids to the teaching of solid geometry, and scales A and B are used as examinations at the end of the semester. *Grades:* 9, 10, 11, and 12.
Publisher: Public School Publishing Company, Bloomington, Illinois.

Survey Test in Decimals and Common Fractions, Grade 6A. By Philip A. Boyer. *Kind:* Survey. *Purpose:* Pupil performance in representative difficulties in arithmetic as prescribed by the Philadelphia course of study. *Grade:* 6.
Publisher: Board of Education, Philadelphia, Pennsylvania.

Reading

Brueckner-Heylmum First Grade Reading Test. By L. J. Brueckner and Clara Heylmum. *Kind:* Survey. *Purpose:* General Reading Attainment. *Grade:* 1.
Publisher: Educational Test Bureau, Minneapolis, Minnesota.

Detroit Word Recognition Test, Form C. By E. M. Oglesby. *Kind:* Survey. *Purpose:* Reading achievement. *Grades:* 1-3.
Publisher: World Book Company, Yonkers, New York.

DeVault Primary Reading Test, Forms 1 and 2. By Nellie M. DeVault. *Kind:* Survey, diagnostic. *Purpose:* Silent Reading Comprehension. *Grades:* 1, and 2.
Publisher: Research Service Company, Los Angeles, California.

Diagnostic Tests in Fundamental Reading Habits, Form A. By Luella C. Pressey. *Kind:* Diagnostic. *Purpose:* Eye movements, vocalization, and certain elements in the acquisition of vocabulary. *Grades:* 2, 3, 4, 5, 6, 7, and 8.
Publisher: Public School Publishing Co., Bloomington, Illinois.

Minneapolis Second Grade Reading Test. By Minneapolis Board of Education. *Kind:* Survey. *Purpose:* General Reading attainment. *Grade:* 2.
Publisher: Educational Test Bureau, Minneapolis, Minnesota.

Sangren-Woody Reading Test, Form B. By P. V. Sangren and C. Woody. *Kind:* Diagnostic. *Purpose:* Achievement in several phases of reading. *Grades:* 4-8.
Publisher: World Book Company, Yonkers, New York.

Science

Lapp's Iowa Achievement Tests in College Physics. By Dr. C. J. Lapp. *Purpose:* Physics achievement as set up in Stewart's *College Physics* (Ginn and Company). *Grade:* College. *Publisher:* Bureau of Educational Research and Service, Iowa City, Iowa.

Social Sciences

Civics

A Test in Civic Action. By Howard C. Hill and Howard E. Wilson. *Kind:* Survey. *Purpose:* Pupil's knowledge of important points in the machinery of civic coöperation. *Grades:* 6, 7, 8, 9, 10, 11, and 12. *Publisher:* Public School Publishing Company, Bloomington, Illinois.

American Council Civics and Government Test. By R. D. Leyh, T. D. McGoldink, P. H. Odegard and Ben D. Wood. *Kind:* Survey. *Purpose:* Achievement in Civics and Government. *Grades:* 11, 12, and College. *Publisher:* World Book Company, Yonkers, New York.

Brown-Woody Civics Test, Form B. By A. W. Brown and C. Woody. *Kind:* Survey. *Grades:* 7, 8, 9, 10, 11, 12. *Publisher:* World Book Company, Yonkers, New York.

Burton Civics Tests. By W. H. Burton and V. N. Burton. *Kind:* Survey, inventory. *Purpose:* Civic information. *Grades:* 5, 6, 7, 8, and 9. *Publisher:* World Book Company, Yonkers, New York.

Economics

American Council Economics Test. By H. Taylor, T. N. Barrons and Ben D. Wood. *Kind:* Survey. *Grades:* 11, 12, and College. *Publisher:* World Book Company, Yonkers, New York.

History

American Council European History Test. By H. J. Carman, W. C. Langsam and Ben D. Wood. *Kind:* Survey. *Purpose:* To measure achievement in European History. *Grades:* 10, 11, 12, and College. *Publisher:* World Book Company, Yonkers, New York.

Denny-Nelson American History Test. By E. C. Denny and M. J. Nelson. *Kind:* Survey. *Purpose:* Achievement in American History. *Publisher:* World Book Company, Yonkers, New York.

Ely-King Tests in American History. By Lena A. Ely and Edith King. *Kind:* Survey, diagnostic. *Purpose:* These tests are a series of seven carefully scaled standardized tests covering seven periods of American History. *Grades:* 6, 7, 8, 9, 10, 11, 12. *Publisher:* Research Service Company, Los Angeles, California.

Lynch American History Test. By I. R. Lynch. *Kind:* Survey. *Purpose:* Attainment covering specific historical period. *Grades:* 7 and 8. *Publisher:* The Educational Test Bureau, Minneapolis, Minnesota.

Test Batteries

Indiana Composite Achievement Test, Forms C and D. By Wendall W. Wright. *Kind:* Survey, Prognostic. *Purpose:* Achievement in nine subjects. *Grades:* 6, 7, and 8. *Publisher:* Bureau of Coöperative Research, Indiana University, Bloomington, Indiana.

Public School Achievement Test, Form 1. By Jacob S. Orleans. *Kind:* Survey, Diagnostic. *Purpose:* Achievement in: a. Reading; b. arithmetic; c. arithme-

tic reasoning; d. language usage; e. spelling; f. grammar; g. history; h. geography; i. nature study, and j. health. *Grades:* 3, 4, 5, 6, 7, and 8. *Publisher:* Public School Publishing Co., Bloomington, Illinois.

Visual Art

Lewerenz Tests in Fundamental Abilities of Visual Art. By Alfred S. Lewerenz. *Purpose:* Includes nine tests in the elemental abilities of visual art—such as recognition of proportion, originality of line drawing, light and shade, knowledge of subject matter, memory of proportion, analysis of problems in perspective, and recognition of color. *Grades:* 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and College. *Publisher:* Research Service Company, Los Angeles, California.

Miscellaneous

Allport A. S. Reaction Study. By G. W. Allport and F. H. Allport. *Kind:* Prognostic. *Purpose:* Personality. *Publisher:* Houghton Mifflin Company, Boston, Massachusetts.

Standard Achievement Test on Principles of Teaching in Secondary Schools, Form 2. By C. W. Odell and M. E. Herriott. *Kind:* Survey. *Purpose:* Knowledge of principles of teaching in secondary schools. *Grades:* Prepared for use by college instructors and city school superintendents and principals in the selection, training, and guidance of high-school teachers. *Publisher:* Public School Publishing Co., Bloomington, Illinois.

Ullman-Clark Test of Classical References and Allusions. By Dr. B. L. Ullman and Grace Clark-Cunningham. *Publisher:* Bureau of Educational Research and Service, Iowa City, Iowa.

NEWS and COMMUNICATIONS

Address all research news and communications to Editor Earl Hudelson, College of Education, University of Minnesota, Minneapolis, Minnesota.

Dr. Dora V. Smith of the University of Minnesota has recently completed a two-year experimental investigation of the effect of class size upon educational efficiency under optimum methods of instruction in high-school English. The experiment was conducted in the University of Minnesota High School. The first year was devoted to an experimental determination of Dr. Smith's best small-class techniques of teaching and her best large-class techniques of teaching; then the second year was devoted to an application of these optimum techniques to classes of twenty-five and fifty pupils. Some twenty specific outcomes were measured. Three trained observers visited and recorded every recitation. This represents the most meticulously conducted and the most elaborately and analytically measured experiment on class size at any educational level.

Subnormal and backward children in special schools and classes maintained by city school systems increased from 10,890 to 51,614 during the thirteen years, 1914-1927, as shown by United States Bureau of Education Bulletin, 1928, No. 5. The number of special classes in city schools for children of lower mentality has about doubled in ten years. The large growth in schools and in enrollment does not indicate that feeble-mindedness is on the increase, but that better provision is made for the care and instruction of such children. The statistics of the Bureau included fifty-one state institutions, thirty private institutions, and two hundred eighteen city day schools. Subnormal and backward children in city schools are usually of higher mentality than are those in state institutions, and are in school only during the period of instruction. City schools, therefore, report no assistants. Sex distribution is about the same in private institutions, but city schools enroll about twice as many boys as girls. In order to make these handicapped young people as nearly self-supporting as possible, they are taught music, household arts, agriculture, manual training, and certain trades, in addition to the usual academic subjects.

Under a subvention from the National School Supply Association, Professors C. J. Anderson and John Guy Fowlkes of the University of Wisconsin, aided by Mr. L. F. Jones, Research Assistant, have prepared and published the second of a series of studies dealing with school supplies and equipment. The present report is entitled "Study of Budgeting and Allotment of School Supplies." It is an analysis of current practices in furnishing and allotting instructional and janitorial supplies and of unit costs.

Mr. Elmer E. Sipe, Supervising Principal of the Burnham, Pennsylvania, Schools, has prepared a mimeographed report of a unique use of the Stanford

Achievement Test. The results of the experiment raised a number of critical issues and revealed some arresting conditions.

On this the thirtieth anniversary of the birth of the juvenile court in America, there are only two states without some law providing for a special court for children. The first such court was established in Cook County, Illinois, in 1899 under an act of the Illinois legislature fostered by the Chicago Woman's Club and the Chicago Bar Association. It is presided over by the Honorable Mary M. Bartelme. Within the same year the second juvenile court, that of Denver, was inaugurated under the leadership of Judge Ben Lindsey.

The surveys made by the National Probation Association, New York City, and the United States Children's Bureau reveal that many of these laws are seriously inadequate and should be amended. A revised Standard Juvenile Court Law has recently been issued by the Association which combines what are believed to be the best features of all of the juvenile court laws that have been enacted in forty-six states.

Centralized schools in rural communities have increased within recent years at the rate of approximately one thousand a year, according to Bulletin, 1928, No. 15 of the United States Bureau of Education, prepared by Timon Covert, Assistant Specialist in Rural Education. Five times this number of one-teacher schools have been abandoned. The change is attributed largely to improved roads, the modern school bus, and larger and better equipped schools under the direction of more highly trained teachers.

The University of Pittsburgh has recently established, in coöperation with local school boards of education, junior colleges in Johnstown, Uniontown, and Erie. A recent University of Pittsburgh Bulletin by the Division of Research in Higher Education, entitled "University of Pittsburgh and its Junior Colleges," describes the beginning and present status of this pioneer undertaking.

Dr. Herbert B. Bruner, Head of the Bureau of Curriculum Research of Teachers College, Columbia University, reports that in an evaluation of thirty thousand courses of study, the Emporia, Kansas Teachers College "Curriculum Construction, Illustrated by Reading for Skills, Appreciation, and Recreation" has been judged to be outstanding. Selected and abbreviated forms of these courses appeared in No. 73 of *Teaching*, published by the Kansas State Teachers College at Emporia.

The current issue of *Review of Legal Education in the United States and Canada*, published annually by the Carnegie Foundation for the Advancement of Teaching, summarizes, in Section I, the recent comprehensive presentation of facts and conclusions which recently appeared in the six-hundred-page report "Present-Day Law Schools." In that report the conclusion was reached that the process of imitation and standardization which has characterized the activities of reformers of legal education during the past forty years may be carried too far. The present need, it is claimed, is for progressive differentiation, rather than for standardization, of legal education and of lawyers.

Section II of the *Review* lists and discusses bar admission requirements, and Section III lists, with their tuition fees, student attendance, and time required to complete their course, the one hundred

seventy-three degree-conferring law schools of the United States and the ten Canadian schools. The Appendix contains the current standards of the American Bar Association and of the Association of American Law Schools, and a list of the publications of the Carnegie Foundation dealing with legal education.

A copy of the *Review* may be had without charge from the office of the Foundation, 522 Fifth Avenue, New York City.

President Frank J. Goodnow announces that on April eighth, the trustees of the Johns Hopkins University, acting upon the recommendation of the Academic Council, created the School of Higher Studies in Education and established the two new degrees of Master of Education and Doctor of Education. By this action, the graduate work in the Department of Education becomes, in part, a university unit parallel to the School of Higher Studies of the Faculty of Philosophy. In taking this action, the trustees of the University express their recognition of the distinctive position of public and private schools in present day life, of the institutionnl need for the specific training of school officers and teachers, and of a more intensive and systematic study of educational problems.

The Trustees also created an Advisory Board of the School of Higher Studies in Education, charged with the arrangement of the instruction of advanced students and of the examinations for the degrees of Doctor of Education and Master of Education.

Students admitted to the new school must be graduates from an approved college, or, in exceptional cases, have completed two preliminary years in collegiate work. Candidacy for either of the degrees is restricted to teachers and school officials with at least three years of approved experience as teachers, supervisors, or administrators.

The formal requirements for the degree of Master of Education include a minimum residence of two academic years in the case of college graduates and of three academic years in the case of other students, the satisfactory completion of not less than ten courses of two hours per week for a year, and the preparation of an approved essay. College graduates accepted as candidates have the privilege of completing the residence requirements for this degree by attendance at not less than eight sessions of summer courses.

In the case of candidates for the degree of Doctor of Education the requirements include residence of not less than three academic years in the case of college graduates and not less than four academic years in the case of other students, one year of residence—preferably the last—in Johns Hopkins University, the satisfactory completion of such courses in addition to those required for the degree of Master of Education as may be specified by the Department of Education, the passing of required examinations and of an oral examination before the Advisory Board, and the preparation and publication of a dissertation.

There are no formal requirements as to foreign languages, but each candidate shall be expected to have a knowledge of such foreign languages as are necessary to carry on his researches, these being determined by the Department of Education.

The Trustees continued the present arrangement whereby students in Education so desiring may become candidates for the degrees of Doctor of Philosophy and Master of Arts under the Board of University Studies, in accordance with its regulation.

A joint English and American committee in secondary education has been organized to study representative secondary schools of both countries for mutual help. Professor E. D. Grizzell of the University of Pennsylvania has spent the year in England directing the organization of this study, has visited a large number of English secondary schools, and has secured the coöperation of various secondary teachers' associations and of other official bodies. The English committee, of which Dr. Cyril Norwood, Head Master of Harrow, is chairman and Mr. C. W. Bailey of Holt School, Liverpool, secretary, has planned the technical details of the survey and approved of a careful examination of statistics and activities of representative schools in both countries. Each set of schools will examine the practices of the other with regard to such matters as curricula, examinations, methods of teaching and discipline, careers of pupils, and educational experiments. The hope is that by the work of this joint committee a better understanding and a more sympathetic relation between English and American educationists will ensue.

Mr. Frank W. Phillips, Chief of the Division of Statistics, United States Bureau of Education, has compiled data which show that 1918 survival rates are no longer applicable to schools. In that year, out of every 1000 entering pupils, 634 reached the eighth grade, 342 entered high school, 139 were graduated, 72 entered college, and 23 were graduated. In 1926 it was estimated that, out of every 1000 entering pupils, 720 reached the eighth grade, 605 entered high school, 432 reached the second year, 321 reached the third year, 262 reached the fourth year, 247 were graduated, 177 entered college, and 48 were graduated.

According to a recent study by F. R. Jacobs, of Parson School, Cincinnati, published in the *Educational Research Bulletin* of Ohio State University, annual teacher turnover in the Cincinnati schools decreased from 7 percent in 1917-1918 to 5.9 percent in 1926-1927. The largest turnover was among teachers of physical education, art, German, industrial art, and kindergarten.

The Department of Educational Research of the Colorado State Teachers College at Greeley has recently published in mimeographed form the report of a preliminary study of class size in that institution. Faculty and students were canvassed for their opinions on various aspects of the class-size situation. The study parallels two chapters of "Class Size at the College Level," a recent report of a four-year experimental investigation of the relation of class size to instructional efficiency in the University of Minnesota. The Greeley report presents comparable Colorado and Minnesota findings in parallel columns.

A Silent Reading Test in French

This is a new silent reading test in French, designed to furnish a reliable, valid, and comparable measure of achievement in comprehension of the meaning of the printed French language at different stages of instruction. The test may be used both in high-school and in college courses in French as an aid in the correct placement and educational guidance of students during their study of French.

The test is based upon a background vocabulary list in French.[1] Insofar as was possible, only words in this list were used in the test. Since the material is

[1] Wood, Ben D. "A Comparative Study of the Vocabularies of Sixteen French Textbooks." *Modern Language Journal*, XI (February, 1927), 263-289.

such as is commonly presented in elementary French textbooks, and since teaching practice follows quite closely the organization and content of such textbooks, the writer feels justified in the method of validating the content of the test.

The experimental tryout of materials and the breaking up of the test items into two duplicate forms follow the procedure described by Ruch and Stoddard. The experimental work on the test was done in three San Diego, California, high schools; seventeen Los Angeles, California, junior and senior high schools; and seven high schools scattered throughout California, Oregon, and Washington. In all, 4,000 students were tested.

The content of the test is varied in order to provide the teacher with clues as to the students' ability to interpret several types of French reading matter: narrative; statements of geographical, historical, and mathematical fact; simple description, poetic description, and scientific description. Each exercise includes a printed French paragraph followed by two questions, each with four suggested responses, only one of which is correct. The organization of the directions and test content gives clues as to students' ability (1) to follow specific directions as stated in the exercise; (2) to analyze reading materials for the essential idea or element in the paragraph; (3) to grasp the meaning of the question as given; (4) to select the one right answer from the several nearly right answers; and (5) to follow thought through a maze of detail. The test is completely objective in form.

The norms were determined for boys and for girls separately. Five percentile points are given for each semester and sex group, percentile ten, quartile one, the median, quartile three, and percentile ninety. There is a gain for each sex group from semester to semester, but the gains are not uniform. "Mental age norms" were computed for the use of teachers desiring to compare pupils' scores on a mental age basis. The mental age yielded by the Terman Group Test of Mental Ability was used.

No satisfactory criterion for validity has yet been found other than that the tests are largely based upon standard classroom practice. The coefficient of correlation for the test scores paired with marks in French is .40 (166 cases), but silent reading skill is only one of numerous factors contributing to such a mark. Reliability coefficients range from .834 (83 cases) to .862 (300 cases). These coefficients indicate a satisfactory degree of reliability. Further investigations of the reliability and validity of the test are now in progress.

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WHERE SHALL WE PLACE THE ASSUMED MEAN?

I want to express my appreciation of Professor Lincoln's brief contribution appearing in the January issue of the Journal and entitled "Where Shall We Place the Assumed Mean?" Since Professor Symonds wrote his article which was published in the April issue of the Journal, I have hoped that someone would say just what Professor Lincoln has said, all of which seems to me to be very pertinent to the question.

Surely, the interpretation to be placed upon a score depends upon the nature of the instrument employed in securing that score. It is clear to me that 14 on the Thorndike handwriting scale means anything from 13.5 to 14.4999 for in using this scale one undertakes to distribute

specimens in such a way that they are scored to the nearest scale step. A similar statement may be made of other quality scales, as the Ayres handwriting scale and Hillegas test for measuring English composition.

It is equally clear that in many other cases, in most educational data in fact, another meaning is to be assigned to a scale score. Scores on tests in most of the school subjects are to be taken as minimum values. If a pupil spells 14 out of 25 words on a spelling test correctly, there is no doubt whatsoever but that his score reaches 56 percent. Inasmuch as he probably knows in part how to spell the fifteenth word, an exact measure of his ability is probably found somewhere above 56 percent, certainly not below.

I repeat that I am glad that Professor Lincoln submitted this communication. While the rest of us who were unwilling to agree with Professor Symonds were doing something else Professor Lincoln has written a very effective rejoinder.

R. L. MORTON

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ON THE MEANING OF A TEST SCORE

At the time of publication of Symonds' "Note on the Finding of the Arithmetic Mean and Median for Grouped Data,"[1] the writer had in preparation a similar discussion which was not submitted for publication since Symonds' treatment seemed quite adequate as a presentation of the issues, and the conclusions reached by him appeared to be correct. However, Lincoln[2] has more recently attempted to refute Symonds' position. For this reason the following comments are offered:

The issue usually turns on the choice of the midpoint in such a class-interval as 20-24. Symonds places it at 22.0 and Lincoln at 22.5. The writer agrees with Symonds, but the choice of the midpoint depends upon our views on the meaning of the test scores. Those holding with Lincoln, e.g., McCall, Garrett, Rugg, Monroe, Hines, Thurstone, *et al*, regard the obtained test score as the *lower limit* of a class-interval of one unit.[3] Thus the score 20 extends from 20.0 to 20.999 . . . , i.e., it means 20 but not yet 21. Symonds is supported by Kelley, Otis, Toops, Pearson, Yule, *et al*, who treat 20 *as the midpoint* of a class-interval having the limits 19.5 to 20.5. The second point of view is, moreover, the universal one among scientists and mathematicians. It will be seen that the choice is between regarding the obtained test score as a midpoint or as a lower limit of a class.

Symonds supports his position with four general types of arguments: (1) consistency with practices in the pure sciences, (2) closer agreement with averages obtained directly from ungrouped data, (3) test norms treat scores at "face value" so that individual scores should be regarded similarly, and (4) weight of authority.

Lincoln's arguments are the usual ones and may be presented by three short quotations.

(1) "The usual measurement in education deals with test results or school costs. In these fields the measurement cannot be taken 'at its face value.' A score of 20 on a test means that the individual made 20 points, and, in most cases, attempted *more items* (italics mine) on which his responses were partly right. Thus his score is always at least 20, and never falls below it." (p. 77)

(2) "Similarly, a cost item of $20 is not an item falling between $19.50 and $20.50, but is actually $20.00." (p. 77)

[1] *Journal of Educational Research*, XVII (1928), 298-300.

[2] *Journal of Educational Research*, XIX (1929), 77-78.

[3] For brevity we shall refer to the two views as differing in considering score as lower limits or midpoints.

(3) " . . . sooner or later in all our educational measurement we get around to considering most of our data on an age or (a) grade basis. Now a child who is 72 months old is never 71.5; he is either 72.0 or 72.0 plus." (p. 78)

These three statements will be considered in order, the first being the fundamental issue.

The first quotation reduces to the assumption that a score of 20 means "20 or more" but "never falls below" 20. The simplest possible special case would be represented by a pupil who attempted and answered correctly items one to twenty (or any 20 items), and who was attempting the twenty-first when time was called. It is to be admitted that a finer scale of measurement would have given him a partial credit for the incompleted item. Conceivably this partial credit would cause his theoretical score to lie within the limits 20.0 and 20.999. . . . The question is where. If we assume a large number of pupils to be in the same situation, 20.5 is a logical value for the average number of *attempts or completions* for the group. Can we go further and assume 20.5 is also the average value for the *number correct?* Granting 20.5 to represent the attempts or completions, it will stand for the "number correct" *when, and only when, the twenty-first item would ultimately have been solved correctly by every pupil.* This is an exceedingly dangerous assumption in view of such facts as:

(1) The usual standard test shows a progression in difficulty from item to item.

(2) Time limits are ordinarily fixed experimentally so that the great majority of pupils can answer all, or nearly all, the items within their power.

It is logical to assume therefore that ordinarily attempted but incompleted items would show a relatively small percentage of successes if added time were allowed. Certainly the twenty-first item of our illustration will not, on the average, be 50 percent correct as the use of 20.5 instead of the observed 20.0 demands.

Lincoln's logic seems to be equivalent to assuming that every pupil would answer correctly every item of a test if time limits were not imposed. Such a test does not exist, and if it did, it would be useless for purposes of measurement.

The choice of 20.5 to represent a "truer" value for an obtained 20.0 becomes even more illogical when we consider the general case, viz., 20 correct and n additional items attempted but incompleted, and hence not entering into the value 20. If we assume a finer scale of measurement giving partial credits, a recorded score of 20 for a pupil attempting seven additional items might conceivably be:

$20 + 0 + \frac{1}{8} + \frac{1}{2} + \frac{3}{4} + 0 + \frac{1}{2} + \frac{3}{4}$, or $22\frac{1}{8}$

Such a case is fully as likely as the special case already considered. The theoretical score does not fall within the limits 20.0 and 20.999 . . . , but on the contrary, might take on almost any finite value. It is to be noted that we have not made any assumptions beyond the ones explicitly stated in the first quotation from Lincoln. The theoretical score reduces to an indeterminate value. We are forced to choose between the obtained value 20.0 and an arbitrary assumption, which, save in a rare and special case, cannot well be taken as 20.5. In concluding this portion of the argument it should be pointed out that our example of 20 consecutive items answered correctly holds for any number of items whether consecutive or not.

The second quotation from Lincoln needs little comment. An item costing $20 is actually represented by $20.00. To

the writer this statement seems to support the views of those opposing Lincoln's position, if it has bearing at all. A more typical example might have been a statement to the effect that the "*per capita* cost of elementary instruction in Blankville is $132 per year." Would such a statement mean "$132 but less than $133" or "$132 to the nearest dollar," i.e., the cost falls between $131.50 and $132.50? Unfortunately, we cannot know from the published data in most instances. Actually we are forced to take the figure at face value, viz., $132. Or at any rate it would simplify matters if figures were published so that they might be handled as stated for purposes of computation; a rule never violated by workers in the exact sciences. If this statement from Lincoln has any pertinence to the discussion, it should be a plea for uniformity and consistency with practices in other fields.

The third quotation may now be considered. To be sure a child actually 72 months old is never 71.5 months of age. But is this the point? What are we to assume when we scan a tabulation listing pupils as 70, 71, 72, 73, . . . months old? The issue is: how were these ages tabulated, to the nearest month or to the month just passed? In practice both cases are common—usually without any accompanying statement as to which classification was employed. Would it not clarify issues if all educational workers tabulated data by values which could be taken as stated for computational purposes? When the physicist writes that an object weighs 72 pounds, he never means that it is exactly 72.000 . . .pounds, but that he will stand by the "2" as being nearer the truth than "1" or "3"; certainly it would never enter his head that any one would assume that he meant "72 but less than 73."

In conclusion it seems defensible to state that the extension of Lincoln's logic to fit more general and more typical cases leaves us with a problem of indetermination. If this be true, practical considerations alone force us to abandon such theorizing in favor of the obtained numerical statements of our data. Moreover such issues tend to become pedantic when we recall that educational measurement deals normally with situations involving unknown or arbitrary zero points, arbitrary scale values, changing units throughout the scale, elements of chance successes and failures, and numerous other irregularities not common to scientific measurement. If we add to these undisputed facts the divers variations and inconsistencies among educational workers in reporting facts, how can we assign any quantitative value which is more defensible than the empirical finding? If we attempt in every instance to decide what a datum means, i.e., whether it is a midpoint or a lower limit, only uncertainty can result. Most standard test scores are lower limits according to Lincoln's view. Scores on handwriting and composition scales never are since the attempt is always to find the scale value "most representative" of the pupil's product. Enrollments, numbers of teachers, days of attendance, etc., must be taken at face value (midpoints). Mental ages and I.Q.'s on the Binet Scale are midpoints; on group tests they are lower limits as in educational tests.

Fully half the time published reports are ambiguous as to the methods of tabulating data. The author has studied dozens if not hundreds of age-score tabulations; not one-third of the time is such an age as "12 years" defined. The same holds for the tables of norms in test guides or manuals. The real need is first for consistency among educational work-

ers and secondly consistency with workers in science and mathematics. To quote Kelley, *Statistical Method*, pp. 12-13, "Uniformity is needed, and it would be in harmony with well-nigh universal procedure in the physical and biological fields to consider a score of 10 as also being a class index, or midpoint of an interval. Should this lower the grade of a few million school children by one-half a point no harm would be done and the great advantage of having the recorded test score measures exactly those to be used in calculating means, standard deviations, correlations, etc., and of having the recorded measures also the class indexes in graphs is attained." The arguments of Otis in his *Statistical Methods in Educational Measurement*, pp. 50-51, may well be noted in arriving at conclusions concerning the issues discussed here.

G. M. Ruch

University of California

Harold—A Third Report

Two brief accounts of Harold M. Finley have appeared in this Journal.[1] Harold was born February 24, 1916. He was tested by the writer with the Stanford revision of the Binet-Simon tests, April 15, 1920. This test, together with observations, constituted the basis of the first account. At that time his IQ, very conservatively determined, was found to be 168.

Our second examination of Harold occurred on June 6 and 7, 1924. At this time we repeated the Stanford-Binet, starting with Year X and using the abbreviated examination. This examination yielded an IQ of 197, suggesting that Harold's IQ, as at first determined, was too low. This fact is easily accounted for, since a slight error at the age of 4-1 means a relatively large difference in the IQ.

At the time of our first examination Harold was able to read fluently from several first-grade readers, which he had not seen before. His parents informed us that he had learned the letters of the alphabet from alphabet blocks by the time he was eighteen months of age, and that he had evidently taught himself to read. At this time he was also very much interested in Place Geography. The first of our accounts gives a list of important cities in Ohio and outside Ohio, which he readily located by giving the county or the state in which the city is located. At that time he was also able to spell the names of these cities, counties, and states. He could recognize the more common American birds and most of the better known makes of motor cars. He could read and write Arabic numerals to 1,000 and Roman numerals to C.

As related in our second account, Harold entered school in September, 1922, at the age of six years and seven months. The teaching force had anticipated his coming and were at a loss to know what to do with him. They finally decided with some misgivings to start Harold in the fourth grade. At the end of the first month, however, the fourth grade teacher's urgent demands that he be promoted to Grade 5 were heeded. He finished the year in the fifth grade, but the next September (1923) he entered Grade 7. Since then he has spent a year in each grade.

When examined with the Stanford Achievement test in June, 1924, Harold's educational age was found to be at the adult level on five of the sub-tests of this

[1] "A Bright Boy." *Journal of Educational Research*, II (December, 1920), pp. 865-68.
"Harold—A Second Report." *Journal of Educational Research*, XI (March, 1925), pp. 231-34.

examination. These were reading for paragraph meaning, reading for word meaning, arithmetic computation, arithmetic reasoning, and the dictation exercise. On the test in reading for sentence meaning, his educational age was found to be 13.8. The same age was earned on the test in history and literature. On the language usage test he earned an educational age of 14.5, and on the nature study and science test, 17.2. All of the information which we were able to gather at that time from a thoroughgoing examination suggested that Harold was living up to our former expectations. The only deficiency discovered in him had to do with mechanical ability.

Harold and his parents visited us May 29, 1928. At this time there was no opportunity for the use of tests of native ability or of educational achievement. The present report will supplement the two former reports in a descriptive way and will record certain facts as to Harold's progress in the past four years.

As stated above, he has spent a year in each grade since entering Grade 7 in the fall of 1923. In other words he has just completed the junior year of high school, at the age of twelve years and three months. His success as a high-school pupil may be judged, in part, from the fact that during the three years, his average grades in all subjects have been the highest given by the school. In his freshman year he studied Latin I, algebra I, English I, and general science. In his sophomore year he carried plane geometry, Latin II, English II, and world history. In his junior year his subjects were Latin III, English III, United States history, and a half unit each of algebra II and solid geometry. Thus he has earned twelve units of secondary credit, with a uniform grade of "E."

This school annually awards an honor merit certificate to those pupils of the highest scholastic standing. When a freshman in high school Harold was one of four to receive this certificate. In his sophomore year he was one of two to be so honored; and in his junior year he was one of six. The high-school enrollment last year was two hundred thirty-two.

Although successful in several lines of intellectual pursuit, Harold's chief interest at the present time lies in the fields of Latin and American poetry. He is carefully writing out his translations in Latin from day to day, typing them, and preserving them as a part of his notes. He reads the magazine, *Poetry*, and such poetry as he discovers in other periodicals. One of his own efforts in the field of poetry follows:

The Prayer of a Poet

O God of gods, be with me while I write,
Reveal yourself to me and prove to me
More fully that you are omnipotent,
That I may write these lines about Thy heaven
As you would have me write—more truthfully—
More like Thy perfect Son did speak and preach
When He was living on your glorious earth,
When His immortal being trod the land—
The holy land which men call Palestine.

O God of gods, please help me see how small
I am, and make me write of higher things—
Of things immortal and as near divine
As you would tolerate a mortal man
To write. And make me worthy to be called
A poet when the critics end their work—
When none to criticise remains but Thee
Then give me my reward and not before,
I ask this through Thy Holy Son.

Amen.

The high school which Harold attends supports two flourishing literary societies. Recently (April 24, 1928) these societies held a contest in debating, oratory, etc. Harold was one of two selected to represent his own society in debating. He and his colleague won the debate. The judges scored the debates on a point scale, giving Harold 269 points, his colleague 251, and their opponents 254 and 255. It is noteworthy that Harold was the only debater who spoke entirely without manuscript or notes. Even in his rebuttal he made no use of notes of any description. Other debaters had anticipated the arguments of their opponents and had carefully written out rebuttal speeches in advance.

Harold is much interested in religious and church matters, as may be gathered from his poem. He takes an active part in the work of their local church, including the Young People's Society.

Harold is small for his age but is in good health. During the last year he was never absent from school. His weight is seventy-three pounds. Other physical measures are probably what one would expect from the data given in our second account.

Many anecdotes might be related indicating the extent of Harold's intellectual interests and the extent to which he gathers detailed information, where others gain only general impressions. For instance his father, while describing his trip to Athens, stated that he could not tell the distance exactly because, "The trip part of the speedometer is out of order." Harold listened to this, smiled, and politely interjected, "It is the *odometer* that is out of order." How many readers of this Journal have learned and observe the distinction between a speedometer and an odometer?

In the small town in which Harold lives, a town of about three thousand inhabitants, the manager of the local theater recently announced an amateur stunt night. Any resident or group of residents of the neighborhood were permitted to stage a short performance and compete for prizes which were offered. Harold won first prize. His stunt consisted simply in getting up on the stage and announcing that if anyone in the group would state his or her name he, (Harold) would give the license number of his or her automobile. Over one hundred people accepted this challenge. Harold responded correctly in all but two cases. These two were traveling men who spent but a small part of their time at home. Several years ago his parents formed the habit of regularly asking Harold the telephone numbers which they might wish to use, thus saving the inconvenience of consulting the directory.

Just now Harold is much interested in collecting autographs. He has succeeded in getting those of President and Mrs. Coolidge, Ex-President Taft, Rudyard Kipling, E. A. Robinson, Chief Justice Marshall of the Ohio Supreme Court, and Governor Vic Donahey of Ohio. Harold prizes very highly the twenty-line letter written to him by Mr. Robinson, who is one of his favorite poets.

When asked how he liked the movies, Harold replied, "I don't go more than seven or eight times a year. I don't care much for picture shows except classical things. Zane Grey does not appeal to me. I thought "Charley's Aunt" good and I enjoy Jackie Coogan. The best picture show which I have seen recently was 'Quo Vadis'."

Harold is keeping a record of the articles which he reads in magazines and is tabulating these to show which magazines are read most frequently. Just now the *American Magazine* leads his list.

The Bookman is second, *The Atlantic Monthly* is third, *Scribner's* is fourth, and *The Country Gentleman* is fifth.

Harold has excellent home environment and will get all the advantages which intelligent, conscientious parents can provide. His father is judge of the local Common Pleas Court and is prominently connected with banking interests in the town. His parents are much concerned just now as to what should be done with Harold, when he graduates from high school in May, 1929, at the age of thirteen. Do the readers of this Journal have an answer to offer them?

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THE EFFICIENCY OF INSTRUCTION IN HIGH-SCHOOL PHYSICS

There is much work being done at present in the objective, quantitative measurement of achievement in the various school subjects. In a recent report of such a study in high-school physics,[1] the investigator concludes that the showing was "much lower than should be expected," and gives the impression that poor teaching was largely responsible, though, of course, not actually making this latter statement.

Since this study is characteristic of several of its kind, both as to method and conclusions, and since it is reported in such a way that it can be studied closely, it furnishes an opportunity for criticism which is not often given to one who does not have access to the original data.

Results of teaching were measured by a "brief-answer" type of test, composed of thirty-six questions; twenty-four on mechanics and twelve on heat. The reader finds upon analysis that:

(1) eighteen demand the recall of a name or term that fits a given situation,

(2) four more require recall of certain isolated facts, such as the acceleration of gravity,

(3) seven are numerical problems, requiring first the recall of a specific formula and then the use of the formula, while

(4) seven may be classed as non-numerical problem questions involving application of principles, provided the student has had sufficient opportunity to become familiar with the terms used. Thus it is seen that less than forty percent can be thought to involve anything more than mere recall, while of this forty percent half are dependent upon fact recall for the correct answer.

The investigator is evidently measuring achievement in terms of ability to recall facts. He says,[2] "Successful achievement in any subject obviously implies the acquisition of the essential facts of that subject." Is this such an "obvious" assumption? Can thinkers be produced, except by chance, when the attention is centered only on ability to recall? The engineer relies on his handbook and the lawyer his library for the systematic recall of needed facts. Success lies in ability to use rather than to recall. In an editorial a few pages further on in this same issue[3] Charters stresses the need for training the student in thinking in order to prepare him to meet future conditions.

A second question is involved in the investigator's interpretation of his findings. He concludes that "the pupils . . . have

[1] Miller, Paul S. "A Quantitative Investigation of the Efficiency of Instruction in High School Physics." *Journal of Educational Research*, XV (February, 1929), pp. 119-127.

[2] *Ibid.*, page 120.

[3] "The Curriculum of the Future." *Journal of Educational Research*, XV (February, 1929), pp. 141-142.

not acquired these facts," that is, those which they should have acquired. But the tables show a range of correct answers of from five to thirty-four, with a median of 23.2. The perfect score would have been 36. The inter-quartile range is roughly from 18 to 27, or from fifty to seventy-five percent of possible rights. This is for grades 10, 11, and 12, and for grade 12 alone, the median is 27. This seems to be a rather high average, especially when the test is of such an academic and technical type as it is. It involves the recall of terms such as dyne, joule, centripetal, water equivalent, etc., etc.; terms which the average student will never see outside of the physics class. Moreover these must be recalled, the advantage of recognition being withheld. Questions such as the following are characteristic: "What is the name of the unit of force which, acting upon one gram of mass, gives it an acceleration of one centimeter per second?" And then the investigator feels that the showing is poor! Truly, to one who has spent some years teaching physics, these 600 students seem to have done remarkably well!

This criticism is leveled not only at this study, but also at a good many others which represent themselves to measure one thing, and in reality measure only a small part of that thing, or something else entirely. This study sets itself up as measuring the efficiency of high-school physics instruction, and in reality it attempts the measurement of only an insignificant phase of the instruction. Yet the conclusions fail to recognize this fact.

In the formulation of tests, for any purpose whatsoever, it is high time that attention be given to the nature of the thing tested for, and to the development of tests which are valid measures of such. The mere fact that a test has been given to a large number of students does not make it "scientific" because this is no insurance that it measures what it is supposed to measure. To be of scientific value the measure must determine with a reasonable degree of accuracy the presence or absence of the thing sought. If ability to recall facts is the objective that is desired, then the tests should involve the recall of facts. But if thinkers are to be produced, then opportunity should be given in the tests for the display of the thinking the student will do when confronted by thought-provoking situations.

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